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26 January 1977

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS  
CYBERNETICS, COMPUTERS, AND AUTOMATION TECHNOLOGY

No. 26

This serial publication contains abstracts of articles from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

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I. DEVELOPMENT AND PRODUCTION OF COMPUTERS AND CONTROL EQUIPMENT  
A. General Treatment

USSR

UDC 518.74

FURSIN, G. I.

COMPUTER CONTROL OF THE RESOURCES OF A COMPUTER INFORMATION NETWORK

Kiev VOPROSY SOZDANIYA RAS I GOSUDARSTVENNOY SETI VYCHISLITEL'NYKH TSENTROV  
[Problems of Establishing the RAS [Republic Automated System] and a State  
Network of Computing Centers, Collection of Works] in Russian 1975 pp 36-41

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V790]

[Text] An examination is made of the problem of controlling the resources of a network of computing centers to work out the organizational structure of management and the architecture of systems software. The resources of the computer information network include not only its computing capabilities, but the information base as well.

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## B. Problem Areas

USSR

BRINS, N., maintenance worker, computing center of the Vitebskaya Oblast Statistical Administration

### LACK OF SPARE PARTS CITED

Minsk SOVETSKAYA BELORUSSIYA in Russian ("Spare Parts....In Parts") 6 Aug 76  
p 2

[Excerpt] Our computing center has seven sets (although not complete ones) of such machines [punched tape computers]. Each set includes four types, each performing a definite job. This computing line will operate smoothly only if all the types of machines (punches, sorters, tabulators, and totaling punches) are trouble-free. But this is not that easy to do. The real problem in our work [mechanics in charge of repair and technical maintenance of the computers] is that we have to do makeshift repair work.

It is not hard to imagine what effort even a slight repair job takes if you do not have the necessary spare part at hand.

We do not have a very good stock of them. We are short of matrices (this is a real scarcity), punch dies, all three sizes of span pieces, transport  
1/3

USSR

BRINS, N., SOVETSKAYA BELORUSSIYA 6 Aug 76 p 2

"rapki" [possibly "carriage"], hard cardboard guides, arms to raise the guides, feeding and removal rollers, and so on.

We get by the best we can. We restore simple parts and make them ourselves. But this is a case of the "lame horse," which will not take you far. After all, we are dealing with precision equipment and a large majority of the parts have to be manufactured at the factory.

Every year our center sends requests for the parts we need to the Main Administration of Computing Work of the Belorussian SSR Central Statistical Administration and every year our requests are met, partially. Can it really be considered normal when computer equipment which costs hundreds of rubles works off and on or is completely down for lack of a one-ruble part? For example, four of our eleven punches are not in working condition. A certain scarce part has been removed from one, from the second a different part was taken out, and so on. And all this is done to keep the other seven punches going. What kind of economics is that?

2/3

USSR

BRINS, N., SOVETSKAYA BELORUSSIYA 6 Aug 76 p 2

The situation must be corrected. A well thought-out, precisely organized spare parts supply system is needed. The annual request for spare parts must be law for our suppliers. Of course, the need for them has to be clearly substantiated in such a case, with no attempts to stockpile reserve supplies. For this it would be a good idea to work out standard service lives tested in practice for all types of spare and other parts: this part should last for such-and-such amount of time, that one for some other period. And repair workers should be penalized or given incentive for overexpenditure or savings of spare parts.

Right now this is not the case. The spare parts come in ... in parts.

3/3

USSR

'SPARE PARTS...IN PARTS':RESPONSE TO SOVETSKAYA BELORUSSIYA ARTICLE

Minsk SOVETSKAYA BELORUSSIYA in Russian 28 Aug 76 p 2

[Summary] A response to N. Brins' letter, which was published in the newspaper's 6 August issue, has been received from A. L. Chernyshev, head of the Main Administration of Computing Work of the Belorussian SSR Central Statistical Administration.

The incomplete meeting of spare part needs for punched tape computers resulted from extremely restrictive ceilings imposed in a centralized fashion by Glavmekhschet [possibly Main Administration of Machine Accounting] of the USSR Central Statistical Administration on the placement of spare part orders with appropriate supplier-enterprises. But the situation with scarce spare part supply has improved greatly in recent times. This is illustrated by the fact that the computing center of the Vitebskaya Oblast Statistical Administration received only five matrices in 1975 and in the first half of this year it has already gotten four; by the end of the year at least seven more will be allocated. For the sake of comparison we should mention that until 1975 the computing center received only 2-3 matrices a year. In addition to matrices, during 1975 and the first half of 1976 the computing

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USSR

SOVETSKAYA BELORUSSIYA 28 Aug 76 p 2

center has also received more than 700 punching dies, 16 guides, nine magnetic couples, and other spare parts.

Glavmekhschet of the Belorussian SSR Central Statistical Administration is now preparing to send the computing centers of the oblast statistical administrations the latest batch of spare parts for all computers, including matrices, transport carriages, left and right guides, span pieces in assemblies (arms with armatures), and others.

Considering that even the enlarged, compared to last year, amount of spare parts being received does not fully meet needs, the computing center of the oblast statistical administration should carefully and completely make up a request for repair of punch equipment to submit to the Minsk Experimental Plant for Repair and Technical Maintenance of Computer Equipment of the All-Union Association Soyuzschettekhnik. The letter says that four punches are now standing idle, but the plant was given an order for just two and they were repaired. The plant was perfectly able to repair all the punches for the computing center.

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USSR

SOVETSKAYA BELORUSSIYA 28 Aug 76 p 2

The Main Administration of Computing Work of the Belorussian SSR Central Statistical Administration is taking steps to receive additional ceilings for spare parts. Specifically, an additional ceiling of 2,600 rubles was received from Glavmekhschet of the USSR Central Statistical Administration, which made it possible to give the appropriate supplier-plants order for badly needed spare parts.

At the present time the All-Union State Planning-Technological Institute of the USSR Central Statistical Administration and the All-Union Association Soyuzschettekhnik are developing a uniform system of planned preventive maintenance for computer equipment. Its introduction will make it possible to significantly improve repair work, technical maintenance, and materials supply.

3/3

USSR

GOLOVACHEV, V., special Correspondent of Trud

GLUSHKOV DISCUSSES PROBLEMS OF AUTOMATED CONTROL SYSTEMS

Alma-Ata TRUD in Russian ("ASU's Should Be Profitable") 15 Oct 76 p 2

[Abstract] In an interview, academician Viktor Mikhaylovich Glushkov, director of the Ukrainian Academy of Sciences' Institute of Cybernetics, discusses problems limiting the effectiveness of computerized management systems (ASU). He observes that the main efforts in the development of ASU are now directed at the creation of 'vertical' systems: plant--main administration--ministry--Gosplan. Far too little attention is being devoted to ties between different industrial sectors. Glushkov says that the main losses in effectiveness are being suffered here. The problem is compounded by the fact that the ministries in charge of preparing ASU (the Ministry of Instrument Engineering, Means of Automation and Control Systems, the Ministry of the Radio Industry and others) operate independently, producing systems without concern for a unified technical policy in the field. The systems are not compatible with one another.

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USSR

GOLOVACHEV, V., TRUD 15 Oct 76 p 2

Glushkov points out the necessity of putting production of computers and preparation of ASU into the same hands. He recommends the creation of a national 'center' free of ministerial subordination which would assume the functions of a general contractor. This center should have capable institutes to formulate comprehensive programs for the implementation of ASU with maximum effect. Glushkov also speaks of the need for changing economic levers and improving the economic mechanism for ensuring the effectiveness of ASU.

In connection with the role of ASU in automation of technological processes, Glushkov states that robots have become one of the elements of ASU. Work in recent years has concerned development of 'second-generation robots', possessing artificial intellect. The primary 'senses' of robots now include vision and touch, and sometimes hearing. Hearing for robots is still very expensive, according to Glushkov, but technology for it is now being perfected in laboratories.

Glushkov also discusses how ASU are serving the needs of different industrial sectors.

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USSR

LAPSHIN, YU., Candidate of Technical Sciences

PROBLEMS OF UTILIZING COMPUTER TECHNOLOGY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian ("The Way Is Shorter: Computer Technology and Concentration of Production") 1 Sep 76 p 2

[Abstract] Discussing computer technology and concentration of production, the author points out some problems that have been limiting the effectiveness of computer technology, and indicates solutions to these problems. He says that computer centers in industry are not operating at their full capacities because they do not have the required complement of peripherals for gathering information from the root source (the production shop or sector), and transmitting it to the computer and on to decision-makers. This is due to lack of production of peripheral equipment. In the last 5-year plan, production of peripheral equipment accounted for not more than 15 percent of all production of computer hardware. Lack of storage devices, magnetic disks, input devices and the like limited the effectiveness of computerized management systems. But in the new 5-year plan, the share of peripheral equipment in the overall production of computer hardware is being raised to almost 50 percent.

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USSR

LAPSHIN, YU., SOTSIALISTICHESKAYA INDUSTRIYA 1 Sep 76 p 2

Observing that computerized systems are most effective in large production complexes, in which the level of utilization of computers can be as high as 500,000 operations per second, the author says that USSR Gosplan will allocate large resources for the expansion of existing computer centers and computerized management systems so that they may attain their rated capacities by the end of the 5-year plan.

With respect to computer software, the author notes that the rates of its development and implementation lags behind development and production of computer hardware. He urges support for the initiative of Minpribor [Ministry of Instrument Building, Automation Equipment, and Control Systems USSR], which is creating a centralized fund of algorithms and programs at the chief organization "Tsentrprogrammsistem" in Kalinin. Other ministries in addition to Minpribor are contributing to the creation of this fund. Minpribor and Minradioprom [Ministry of the Radio Industry USSR] have also created special organizations for servicing computers, which includes installation of equipment, maintenance checks, and programming.

2/3

USSR

LAPSHIN, YU., SOTSIALISTICHESKAYA INDUSTRIYA 1 Sep 76 p 2

Commenting on the importance of computerized systems in R & D, the author says that research and design organizations will be beneficiaries of 20 percent of the computer capacities introduced in the 5-year plan.

3/3

USSR

SHARIKOV, T., Candidate of Technical Sciences, Moscow

NEED FOR COMPUTER CENTER NETWORK IN KIRGIZIYA DISCUSSED

Frunze SOVETSKAYA KIRGIZIYA ("On the Agenda--ASU-Kirgiziya") in Russian  
5 Nov 76 p 3

[Excerpt] At enterprises that are competently introducing electronic computers for management purposes (the Leningrad Optical-Mechanical Association and others), putting into operation just the first sections of the automated control system has resulted in a sharp increase in the rate of growth of labor productivity, has reduced the amount of uncompleted output, and has increased the smoothness with which work functions.

Nevertheless, there are many shortcomings and omissions in the introduction of the automated control system and the utilization of the computer. The principal one is insufficient use of the computers. The average daily load of the computer amounts to less than 10 hours instead of the feasible and economically necessary 14-18 hours. Moreover, these hours have been used merely to perform extremely simple accounting and statistical tasks, which cannot result in the obtaining of the greatest possible economic impact from the use of the computer.

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USSR

SHARIKOV, T., SOVETSKAYA KIRGIZIYA 5 Nov 76 p 3

Expensive computer time continues to be unused since many enterprise directors are endeavoring to acquire their own "native" computer. This results in unwarranted material expenditures and an unjustified increase in the number of workers.

A way out of the situation that has arisen lies in the creating of a State Computer Center Network [GSVTs], joining the communication channels of all the country's computer centers [VTs].

The State Committee for Science and Technology, together with the ministries and departments, has drawn up a plan for such a center. It is intended that any computer center that belongs to the State Computer Center Network will be able to obtain the information required for any given computation from the other centers in the unified system.

The state network will be based on territorial and group computer centers for collective use [VTsKP]. Estimates show that economically they are far superior to computer centers that serve individual economic organizations. The computer load, once the VTsKP has been set up, will increase by not less than one and a half times, and capital investments will be approximately halved.  
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USSR

SHARIKOV, T., SOVETSKAYA KIRGIZIYA 5 Nov 76 p 3

The State Committee for Science and Technology has drawn up a proposal for the setting up of 22 computer centers for collective use during the 10th five-year plan. They are needed in Kirgiziya. Let us take as an example the republic's association Kirgizsel'khoztekhnika [Kirgiziya Agricultural Equipment], which has a commodity turnover volume of more than 200 million rubles per year and serves more than 800 organizations and enterprises. Its output turnover contains more than 100,000 items. The association has the use of only the computers of a certain series, and this is inefficient for such a large organization. However, to set up its own Main Computer Center, equipped with third generation computers of the Ryad type, would be too expensive. Here is where the organization of a computer center for collective use (feasible for the Ministry of Agriculture) is natural, cheaper, and more expedient.

During the current five-year plan, the volume of industrial production in the republic is to be increased by 37 percent. This increase is to be achieved without putting into operation substantial additional capacities, mainly by improving the organization of production and further expanding and re-equipping existing enterprises.  
3/4

USSR

SHARIKOV, T., SOVETSKAYA KIRGIZIYA 5 Nov 76 p 3

The successful performance of these tasks could be furthered by the complex introduction of electronic computers in automated control systems.

The creation of ASU -- Kirgiziya, based on republic group computer centers for collective use [RVTsKP] has been put on the agenda by life.

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USSR

#### PROGRESS AND PROBLEMS OF COMPUTERIZED MANAGEMENT SYSTEMS IN UZBEKISTAN

Tashkent PRAVDA VOSTOKA in Russian ("Economics and ASU. In the Republic Council for Assisting Scientific-Technical Progress Under the Central Committee of the Communist Party of Uzbekistan") 19 Jun 76 p 2

[Abstract] The article reviews progress on implementation and operation of computerized management systems (ASU) in enterprises and organizations of Uzbekistan. In the last 5-year plan, about 70 various ASUs were put into operation, and there are now more than 250 electronic computers at work in the republic's economy. The Uzbek Gosplan was the first in the Soviet Union to introduce a large, inter-branch computerized system for planning calculations, and the Uzbek Ministry of Power Engineering and Electrification introduced the first industry computerized management system (OASU) among the country's energy systems. The Uzbek Academy of Sciences' Institute of Cybernetics, which employs about 2000 specialists, serves as the republic's scientific and methodological center for ASUs. It not only coordinates work at individual enterprises, but also creates its own affiliates in oblasts in order to develop and introduce territorial systems.

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USSR

PRAVDA VOSTOKA 19 Jun 76 p 2

Despite such successes, many problems with ASUs were brought to light at the recent meeting of the presidium of the Uzbek Communist Party Central Committee's Council for Assisting Scientific and Technical Progress. Facts of low utilization time of computers and computers standing idle altogether were revealed. Methods for calculating expenditures on ASUs and determining their effectiveness are inadequate. For example, Glavtashkentstroy calculated expenditures of 114,000 rubles on its ASU with an economic gain of 2 million rubles, when in fact expenditures on the system totaled 3.8 million rubles, and the actual economic effect was only 100,000 rubles.

Among other problems noted are the lack of understanding on the part of enterprise managers of the importance and place of ASUs in production, and slow progress on implementation of ASUs.

A number of recommendations were made for eliminating these problems. They include creation of computer time-sharing centers; development of standard methods for processing and issuing information for use by all ministries, agencies and enterprises; and creation of a large center for maintenance and repair of computer equipment in Tashkent. It was also pointed out  
2/3

USSR

PRAVDA VOSTOKA 19 Jun 76 p 2

that there is a need for computerized systems for control of technological processes in the chemical, metallurgical and others industries.

USSR

ZAKARLYUK, L., engineer

#### WORK OF THE NAMANGAN COMPUTER CENTER

Tashkent PRAVDA VOSTOKA in Russian ("The Computer--A Full Load") 14 Oct 76 p 2

[Excerpts] The machine processing station of the Namangan Oblast Statistical Administration recently observed its tenth anniversary. It has been processing about a quarter of a million punched cards a month, performing three to four million operations on calculations alone in connection with this. Thanks to the enthusiasm of the workers in the statistical administration and the machine processing station, computer-aided mechanized output of the most labor-consuming monthly statistical reports on industry, agriculture, and construction is being done. The complete mechanization of the output of all basic statistical reports and the completion thereby of the creation in the oblast center of the first stage of a territorial automated system for state statistics (ASSS) is impending in the current year.

The station is not restricted to computer work for the statistical administration. Its customers include more than 30 enterprises and organizations in Namangan. In actuality it is a station for collective use. The arrival  
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USSR

ZAKARLYUK, L., PRAVDA VOSTOKA 14 Oct 76 p 2

of a third-generation computer is expected in the near future, and then it will be possible to speak of a computer center.

At the present time, unfortunately, there are still disruptions and mistakes in the work. One of the reasons is the obsolescence of some of the machines. New technology will permit a sharp increase in the quality and timeliness of the output of reports for all customers. At this time the staff of the station has turned its attention to the quality of its fulfillment of orders and tasks. Thus, regular conferences on quality with invitations to our customers are planned, and we expect them to state their objective claims. An open discussion of the deficiencies in the mechanization of computational work will be of use to both sides.

The staff of the station is trying to broaden the scope of the orders being filled. It is planned to accept for processing computations from the organs of social security and the centralized accounting offices for health care and education. Unfortunately, not very many people have shown an interest in this so far. New customers are in part frightened by the newness of the accounting methods, the necessity of observing strict accounting  
2/5



USSR

ZAKARLYUK, L., PRAVDA VOSTOKA 14 Oct 76 p 2

discipline, and sometimes too by questions of payment for the work done by the machine processing station. Of course, in any new approach there can be misunderstandings and mutual failures to work things out, which sometimes weaken the desire of short-sighted comrades to mechanize computational work. Others think that the mechanization of accounting can be provided by a single stroke of a pen on an agreement.

Our negotiations with the Namangan Beer and Lemonade Plant for computer-assisted mechanization of their accounting jobs are typical. For almost four months we could not obtain concrete requirements from the chief accountant of the plant. And this despite the well-disposed attitude toward the job of the director and the chief engineer. The accounting office blamed the complexity of the task, a lack of free time, and other reasons.

The employees of the station developed a computer program to mechanize the accounting for packing materials as a task from the Namangan Wine-making Plant. Test runs were made which satisfied both parties. And then an announcement came from the plant that the volume of computational work was small and the managers of the enterprise rejected the already developed program.

3/5

USSR

ZAKARLYUK, L., PRAVDA VOSTOKA 14 Oct 76 p 2

The introduction of a powerful computer will permit us to take on the service of the majority of enterprises and organizations in Namangan. But even today one cannot help being concerned about the problem of the workload of the new machinery because of the ill-disposed attitude to this work of the managers of current equipment is still not used to the full.

The situation is no better in other enterprises and organizations of the city and oblast which have electronic computers. In the branch of the SANIIESKH [Central Asian Scientific Research Institute for Agricultural Economy] the "Nairi" computer works three to four hours a day. Because of a lack of room, the YeS-1020 computer in the branch of the SPKB [Special Design and Planning Bureau] of the Institute of Cybernetics did not operate at all for a long time. In addition, one machine hour of work on it costs 80 rubles.

If we could wisely undertake the installation and use of the computer technology already existing in Namangan, much could be accomplished. The difficulty is that the computer equipment is located in certain departments, while it is essential to mechanize computational jobs in the enterprises and organizations subordinate to other departments, and at the same time

4/5

USSR

ZAKARLYUK, L., PRAVDA VOSTOKA 14 Oct 76 p 2

there has not been a competent coordinating organ in Namangan, and questions concerning computer-aided mechanization have been settled in an uncontrolled manner by each department independently and inefficiently.

Not too long ago a computer center was created in the city. Now it is important that it really become a center for collective use.

This is a mandate of the times. In Moldavia it has been decided to create on the basis of shared participation a computer center for collective use to service 17 ministries and departments. The construction and operation of this center has been entrusted to the Central Statistical Administration of the republic.

On the basis of the computer centers of the Central Statistical Administration system, computer centers for collective use are being created in Minsk, Tallin, Tula, and Tomsk.

The creation of such centers...will make it possible to cut the costs of creating and operating automated control systems in small and medium-sized enterprises almost in half.

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## CZECHOSLOVAKIA

RAIS, Karel; Computer Laboratory, Technical University, Brno

### AVAILABILITY OF COMPUTER SYSTEMS

Prague INFORMACNE SYSTEMY in Czech Vol 5, No 2, Jun 76 pp 165-171

[Abstract] Problems of availability of computer systems are analyzed. Mathematical expressions describing various aspects of reliability of computer systems are derived. Availability of the TESLA 270 computer system is discussed on the basis of an operating period of 24,000 hours achieved during a period of four years. The TESLA 270 system consists of a computer proper, printout facilities, card reading system, four mgp units and a classifier, all operating faultlessly. The TESLA 270 system was operating in three eight hour shifts a day for the entire period; eight hours a week was devoted to planned maintenance. The ratio of the period of operation to the number of shut-downs during the investigated period was 134.5 to 452.4 hours; the ratio of the total periods needed for maintenance to the number of individual shutdowns was about 1.0 to 3.8. Net operating time is the time during which faultless operation of the system was proceeding. It is important to minimize periods of shut-downs, both planned and accidental ones. Periods between repairs are important because they represent the actual operational periods of the computer system. 1 Figure, 2 Tables, 6 References: 2 Czech, 1 USSR, 3 Western.

1/1

## C. Production Plants

USSR

### TESTING OF YES-1035 COMPLETED AT MINSK INDUSTRIAL ASSOCIATION

Minsk SOVETSKAYA BELORUSSIYA in Russian ("The Family of Computers is Growing")  
2 Oct 76 p 2

[Summary] The Minsk Industrial Association of Computer Technology [Minskoye Proizvodstvennoye Ob'yedineniye Vychislitel'noy Tekhniki] is increasing its output of computers from year to year and implementing extensive unification of parts, conveyerization, and mechanization and automation of both basic and auxiliary processes. The Association is also applying production-line methods of assembling, wiring, and debugging computer equipment.

The testing of a new computer, the YeS-1035 was recently completed successfully. This model is simple and convenient to use and requires fewer specialists to service it since it is equipped with an automatic diagnostic system that enables the machine itself to find and help eliminate malfunctions.

The staff of the association is successfully carrying out the program of the 10th five-year plan. Since the beginning of the year, they have achieved an output of millions of rubles over the plan thanks to greater productivity of labor and intensification of production. Workshop No 8 is in the vanguard  
1/2

USSR

SOVETSKAYA BELORUSSIYA 2 Oct 76 p 2

of competition. Its section for semi-products and tinplating was the winner in the sixth stage of the competition in honor of the 60th anniversary of the Great October Revolution. The workers of the shop are now striving to complete their schedule three days ahead of time.

Two photographs accompany the original article [not reproduced]. The first shows shift foreman M. Grinkevich and electrician A. Makav'yev, a shock worker of communist labor, standing at the assembly line for wiring the series-produced YeS-1022 computer. The second shows G. Tsivinskaya, supervisor of the section for semi-finished products and tinplating, and front-rank production workers T. Trachinskaya, Ya. Dovnar, and T. Rybaltovskaya.

USSR

TSIKORA, S., correspondent of Izvestiya, interviewer (Kiev)

#### INTERVIEW WITH DESIGNER OF POCKET CALCULATORS

Moscow IZVESTIYA in Russian ("To the Engineer and to the School Child") in Russian 18 Jul 76 p 2

[Abstract] In an interview, Valentin Zakharov, chief designer of microcalculators at the Kiev Production and Engineering Association "Kristall" discusses the benefits and features of microcalculators developed by the corporation. He comments that the large integrated circuits used in these calculators were designed so that the corporation could create a programming microcalculator which represents the highest achievement among instruments of its kind. Zakharov says that there are only two or three foreign firms manufacturing models on a par with the Soviet microcalculator, which is now on the market.

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USSR

#### SHORTAGE OF POCKET CALCULATORS WILL SOON BE REMEDIED

Moscow IZOBRETATEL' I RATSIONALIZATOR in Russian ("Invented in the USSR") No 10, Oct 76 pp 20-21

[Excerpt] NOT LONG TO WAIT. Up until now we have encountered miniature computers mostly in exhibits. It appears that the situation will change in the immediate future. The Kiev Association "Kristall" is mastering series production of the programmable keyboard computer "Elektronika BZ-21," shown in the photo [not reproduced]. The "Elektronika" computers are based on semiconductor circuitry developed under the direction of the chief designer V. P. Zakharov, Candidate of Physico-Mathematical Sciences. Miniature computers may be powered by batteries or by electrical networks.

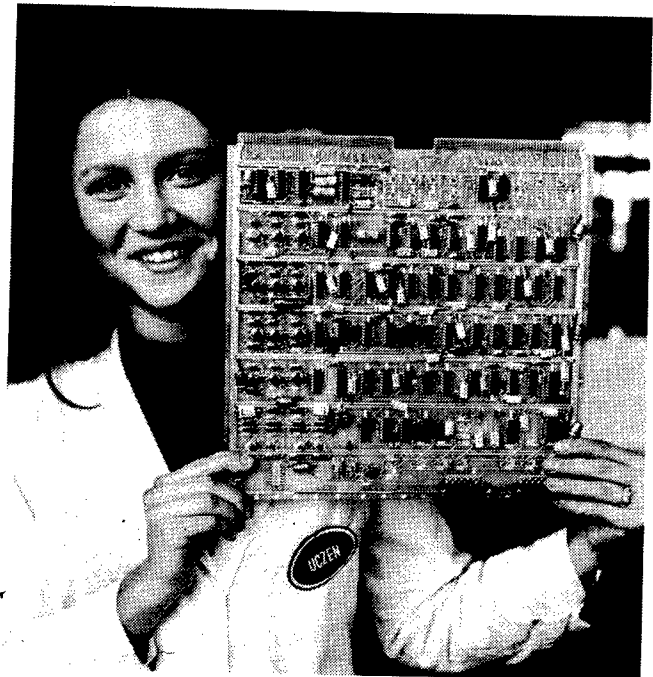
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## EAST GERMANY

### COMPUTER EQUIPMENT FROM "ERA"

Leipzig URANIA in German No 3, 1976 p 59

[Excerpt] The People's Republic of Poland has a highly developed electronic data processing equipment industry. The "Odra" computers are very well known in the German Democratic Republic, where they have been used with success. The "Era" Measuring Equipment Factory in Warsaw is one of the major suppliers of the Polish computer manufacturers; its production goes primarily (80 percent) into computers. The "Mera 300" system developed in this factory contributes to the production of computers in various sizes, from minicomputers to process computers. The photograph on the left shows the wiring of the panel of a magnetic-drum memory by means of the modern wirewrap method; the photograph on the right shows the circuitry of a small computer, where the dark blocks indicate integrated circuits.



## D. Unified System or Ryad Series

USSR

MATUKOVSKIY, N.

SERIES PRODUCTION OF YES-1022 BEGUN

Moscow IZVESTIYA in Russian ("A Fast Computer") 30 Dec 76 p 2

[Summary] Series production of the YeS-1022 computer has begun at the Brest Electromechanical Plant, which specializes in the manufacture of machines developed in accordance with the Comprehensive Program of CEMA. The YeS-1022 is intended for the solution of a large range of problems in science, technology, economics, and information-logic, as well as for use in automated control systems. Its speed is 80,000 operations per second, which is four times greater than that of the YeS-1020.

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## E. Hardware

USSR

MELIKSETYAN, R.

STATE TESTING OF NEW NAIRI-4 COMPUTER COMPLETED

Moscow NEDELYA in Russian ("Hello, Nairi-4") 27 Dec 76 -- 2 Jan 77 p 3

[Abstract] The article reports that state testing of a new computer of the "Nairi" family, the "Nairi-4," has been completed at the Yerevan Scientific Research Institute of Mathematical Machines, and that the computer has been approved for series production.

According to academician Anatoliy Alekseyevich Dorodnitsyn, the computer is unique, surpassing existing models of this family as well as other Soviet computers of its class. It is the first computer in the Soviet Union to utilize the principle of 'nanoprogramming', providing for interpretation of an advanced system of micro-commands and unification of means of control of the computer. The size of the computer has been greatly reduced. It is the first in the country to have a memory based on cylindrical magnetic films of a new type, which eliminates destruction of information. In general, the computer design incorporates a number of structural solutions which are characteristic of fourth-generation computers.

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USSR

MELIKSETYAN, R., NEDELYA 27 Dec 76 -- 2 Jan 77 p 3

The "Nairi-4" performs approximately 500,000 operations per second. The capacity of its working memory exceeds 64,000 alpha-numeric symbols, and its main channel has a carrying capacity of 30 million information units, making it possible to control processes lasting only millionths of a second. In addition, numerous objects to be monitored or controlled can be plugged into the computer simultaneously.

The computer was developed over a period of four years by a group headed by chief designer G. Oganyan. The group also included Oganyan's deputies R. Nalbandyan; Sh. Arutyunyan and S. Mkrtchyan; E. Dzhandzhulyan, principal developer of the main channel; A. Sarkisyan, who solved questions regarding computation; R. Mikayelyan, designer; and G. Aslanyan, mathematician-programmer.

The "Nairi-4" will be used for such tasks as automation of a designer's work place, monitoring the quality of radioelectronic apparatus, controlling technological processes, and air traffic control at large airports.

2/2



USSR

MINAYEV, V.

#### HYBRID COMPUTER SYSTEM DEVELOPED

Riga SOVETSKAYA LATVIYA in Russian ("Omega-2' Is Born") 14 Oct 76 p 4

[Summary] "Omega-1" was the name of a hybrid computer system developed in the Laboratory of Analog Simulation, Riga Polytechnical Institute, under the guidance of Candidate of Technical Sciences E. Rode. This system proved to be a useful tool for solving problems in rational development of petroleum deposits. It was able to perform computations 10-100 times more quickly than a digital computer, while still retaining the very highest accuracy, and it yielded a yearly savings of millions of rubles.

Now the scientists at RPI [Riga Polytechnical Institute] are conducting experimental operation of a new and more advanced hybrid system, "Omega-2," which will have great value in predicting petroleum deposits, compiling more accurate weather forecasts, solving fundamental problems in mathematical physics, etc.

While working on "Omega-2," its inventors encountered an unforeseen difficulty: they did not have a sufficiently advanced device for testing the  
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USSR

MINAYEV, V., SOVETSKAYA LATVIYA 14 Oct 76 p 4

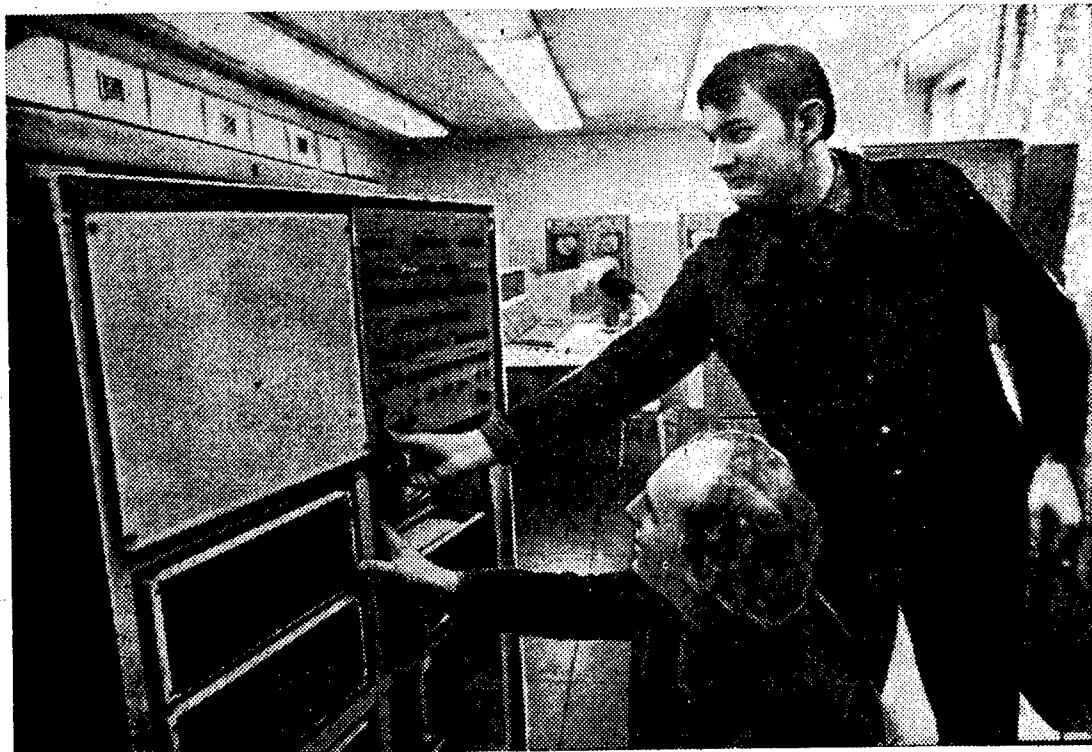
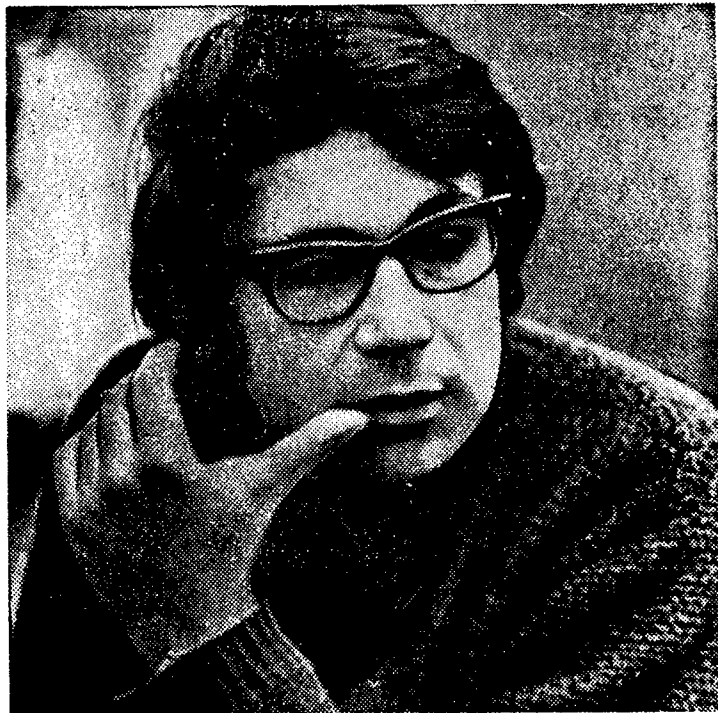
efficiency of new electronic circuits. The mission of developing such a device was entrusted to Ya. Shlikhte, a young engineer in his final year at RPI this year, who coped with the task brilliantly. The general-purpose commutator which he designed and manufactured won the attention of specialists at the VDNKh SSSR [Exhibition of Achievements of the National Economy USSR], where it was exhibited, and it will soon be sent to an exhibit in Warsaw. Engineers from the VEF [State Electrical Engineering Plant] are interested in the commutator, and in the near future it will be utilized in the radio-electronics industry.

In the photographs: below -- Ye. Kamparzale and Ya. Bleyer (on the right), students in their final year at the institute, are testing circuitry variants of the "Omega-2"; above -- Candidate of Technical Sciences E. Rode, director of the Sector for Developments in Hybrid Systems Hardware.

2/3

USSR

MINAYEV, V., SOVETSKAYA LATVIYA 14 Oct 76 p 4



3/3

USSR

UDC 681.327.8

KARACHEV, V. A., and MURAV'YEV, A. G., engineers

ELEMENTS FOR LINKING THE ASVT-M COMPUTER MODEL M-6000 WITH DATA TRANSMITTING EQUIPMENT

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No 4, Jul/Aug 76 pp 75-77

[Abstract] Information exchange between the M-6000 computer and data transmission equipment takes place via connecting circuits whose nomenclature and signal exchange parameters are regulated by standards. In order to make the M-6000, which is based on integrated microcircuits, compatible with the data transmission equipment, a special receiver and transmitter were developed. The receiver consists of a threshold device and a matching cascade. The threshold device is a circuit with two steady states (trigger) mounted on an operational amplifier. Connected to the positive feedback of the trigger is a diode bridge, which, together with the voltage divider switches, assures that fixed values of the reference voltage on the inverting input of the operational amplifier are obtained. The trigger is switched at voltages on the inverting input of the operational amplifier exceeding the reference voltage in absolute value. In testing models with limiting values of the  $1/2$

USSR

KARACHEV, V. A., and MURAV'YEV, A. G., MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA Jul/Aug 76 pp 75-77

parameters the following data were obtained: a time of switching the voltage on the transmitter output of not more than 4 microseconds; a time of delay of switching the voltage on the receiver output upon achieving a voltage on the receiver output of the operational threshold of not more than 2 microseconds; the change of the operation threshold voltage of the receiver during change of the voltage of the power source does not exceed 5%; the change of voltage of the operation threshold during temperature variation in the range of 5-60°C does not exceed 4%. There are five receivers and five transmitters on a standard ASVT-M plate 140 x 115 mm in size.

HUNGARY

UDC 53.08:62-52

HATFALUDI, Laszlo, Computer Technology Coordination Institute

TYPE ET-112 FUNCTIONAL MEASURING AUTOMATON BASED ON THE R-10 COMPUTER

Budapest MERES ES AUTOMATIKA in Hungarian Vol 24 No 7, 76 pp 257-262 manuscript received 10 Nov 75

[Abstract] The Type ET-112 card-measuring automaton, controlled by the R-10 computer, developed at the Hardware System Engineering Laboratory of the Computer Technology Coordination Institute, is described and illustrated with a photograph, block diagrams, circuit diagrams, performance charts, and sample programs. It is suitable for measuring R-10 and R-12 cards. It can operate only on-line, and may be adapted also for other TTL or DTL panels containing no more than 172 connecting points. It is interfaced to the R-10 by means of a PT-100 card. The interface, functional units, operating system, and programming are described. The Institute has also developed other similar automata such as the Type ET-100, which was described in the Computer Engineering Conference Proceedings of 1974. Figures 5; table 1; references 4: 2 Hungarian and 2 Western.

1/1

USSR

UDC 518.74

BARINOV, S. V. and MIKHENKO, YU. A.

INTERCOMPUTER DIALOG SYSTEM FOR 'MINSK-32' COMPUTERS

Kiev TEKHNICHESKIYE I MATEMATICHESKIYE SREDSTVA ORGANIZATSII DIALOGOV V VYCHISLITEL'NYKH SISTEMAKH [Hardware and Software for Dialog Organization in Computer Systems, Collection of Works] in Russian 1975 pp 33-38

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V794]

[Text] In the Department of Technical Facilities for Automated Control Systems, Special Design Bureau of Mathematical Machines and Systems of the Institute of Cybernetics, Academy of Sciences UkrSSR, the "Dialog" system has been developed for direct intercomputer exchange between "Minsk-32" computers without an intermediate carrier. In accordance with requirements of the working program being implemented, the "Dialog" system can establish a link and exchange data as needed for further use in the given working program.

1/1

USSR

UDC 518.74

SMAKOTINA, T. A.

SOFTWARE OF THE DATA TRANSMISSION SYSTEM FOR THE M-4030 CONTROL COMPUTER COMPLEX

TRUDY INSTITUTA ELEKTRONNYKH UPRAVLYAYUSHCHIKH MASHIN [Works of the Institute of Control Computers] in Russian No 48, 1975 pp 16-23

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V746 by L. Shternberg]

[Text] Data transmission software is a program supplement to the DOS [Disk Operating System] of the ASVT modular system of computer facilities to support the operation of dialog packages of applied programs from very remote terminals. The data transmission software retains all the service capabilities of the ASVT DOS and requires no changes in the DOS. The software is designed for connecting the terminals through a data transmission control unit. The main component of the software is a data transmission control program that is an expansion of the allocator supervisor. The data transmission control program controls the operation of equipment on the physical level and handles the reception and transmission of messages. The data transmission control program

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USSR

SMAKOTINA, T. A., TRUDY INSTITUTA ELEKTRONNYKH UPRAVLYAYUSHCHIKH MASHIN No 48, 1975 pp 16-23

occupies a separate program section and handles segmentation, buffering and recording of messages, controls waiting lines and diagnoses erroneous situations. The data transmission control program realizes a logic interface with the program user, providing exchange with the terminal on the microcommand level. The data transmission software enables generation of data transmission control programs with different parameters depending on the configuration of the system.

2/2

USSR

UDC 518.74

GOROKHOVSKIY, S. S., KAPITANOVA, YU. V., LETICHEVSKIY, A. A.

L2 -- A LANGUAGE FOR PROCESSING DATA STRUCTURES AND ITS REALIZATION

Novosibirsk TRUDY VSESOYUZNOGO SIMPOZIUMA PO METODAM REALIZATSII NOVIKH ALGORITMICHESKIKH YAZYKOV [Transactions of the All-Union Symposium on Methods of Realizing New Algorithmic Languages] in Russian Part 2, 1975 pp 177-186

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V718 by N. Balyberdina]

[Text] The paper gives fundamental information on the L2 algorithmic language designed for solving problems that involve automation of computer design and software planning. In development of the language, considerable attention was given to working out a precise formal concept of the structure of data; an algebraic approach was used for representation of the data structure, providing both the formalism needed for constructing a strict base for the L2 language and the capability of working with operators of a fairly high level.

The characteristics of the media for the L2 language are presented. The principal idiosyncrasies are considered, and basic principles are formulated for construction of the programming system in which the L2 language is realized. An example is presented of a program for a general-purpose syntactic processor.

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USSR

UDC 518.74

SOFTWARE FOR THE GVS-100 HYBRID COMPUTER SYSTEM. No 2. SYSTEM OF COMMANDS FOR THE ANALOG PART AND THE CONVERSION/CONNECTION UNIT

Moscow MATEMATICHESKOYE OBESPECHENIYE GIBRIDNOY VYCHISLITEL'NOY SISTEMY GVS-100. VYPUSK 2. SISTEMA KOMAND ANALOGOVOY CHASTI I USTROYSTVA PREOBRAZOVANIYA I SOPRYAZHENIYA in Russian, Institute of Control Problems, 1975, 68 pp mimeo.

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V689K (annotation)]

[Text] A description is given of commands for controlling the analog part and the conversion/connection unit of the GVS-100 hybrid computer system. The formats of the commands and particulars of implementing them are presented. Recommendations are made on using the commands.

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USSR

UDC 518.74

GRIDCHIN, R. V., PERMINOV, O. N. and SHCHUKIN, B. A.

CONVERSION OF COBOL PRODUCTION CONTROL PROGRAMS

Moscow OBRABOTKA DANNYKH NA EVM TRET'YEGO POKOLENIYA [Data Processing on Third-Generation Computers, Collection of Works] in Russian, 1976 pp 140-143

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V776]

[Text] A convertible set of programs is designed for automating operational-calendar planning and control of discrete production. The initial programs are written in COBOL for the translator of the "Minsk-32" computer. Translation of programs for computers in the unified system [YeS] is done by using a converter from "Minsk-32" COBOL to YeS COBOL.

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## G. Automated Design and Engineering

USSR

DORODNITSYN, A. A., academician

SAPR COMPUTERIZED DESIGN SYSTEM BEING DEVELOPED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian ("The Computer Learns to Design") 14 Aug 76 p 4

[Abstract] Academician Dorodnitsyn discusses the SAPR computerized designing system which is being developed by the Computer Center of the USSR Academy of Sciences. The purpose of the system is to free engineers from uncreative work in the designing of machines, and also to eliminate errors in design work. SAPR's 'eyes' and 'hands' are video display screens, printing devices and automatic diagram composers (grafopostroiteli). Its 'brain' is a computer capable of performing millions of operations per second. SAPR calculates several variants of a design and then selects the best one. It also conducts testing of designs according to mathematical models. Dorodnitsyn says that SAPR is being developed in such a way that changes and additions can be made in it according to the latest scientific and technical achievements.

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USSR

Photo Caption

Moscow PRAVDA in Russian 24 Oct 76 p 3

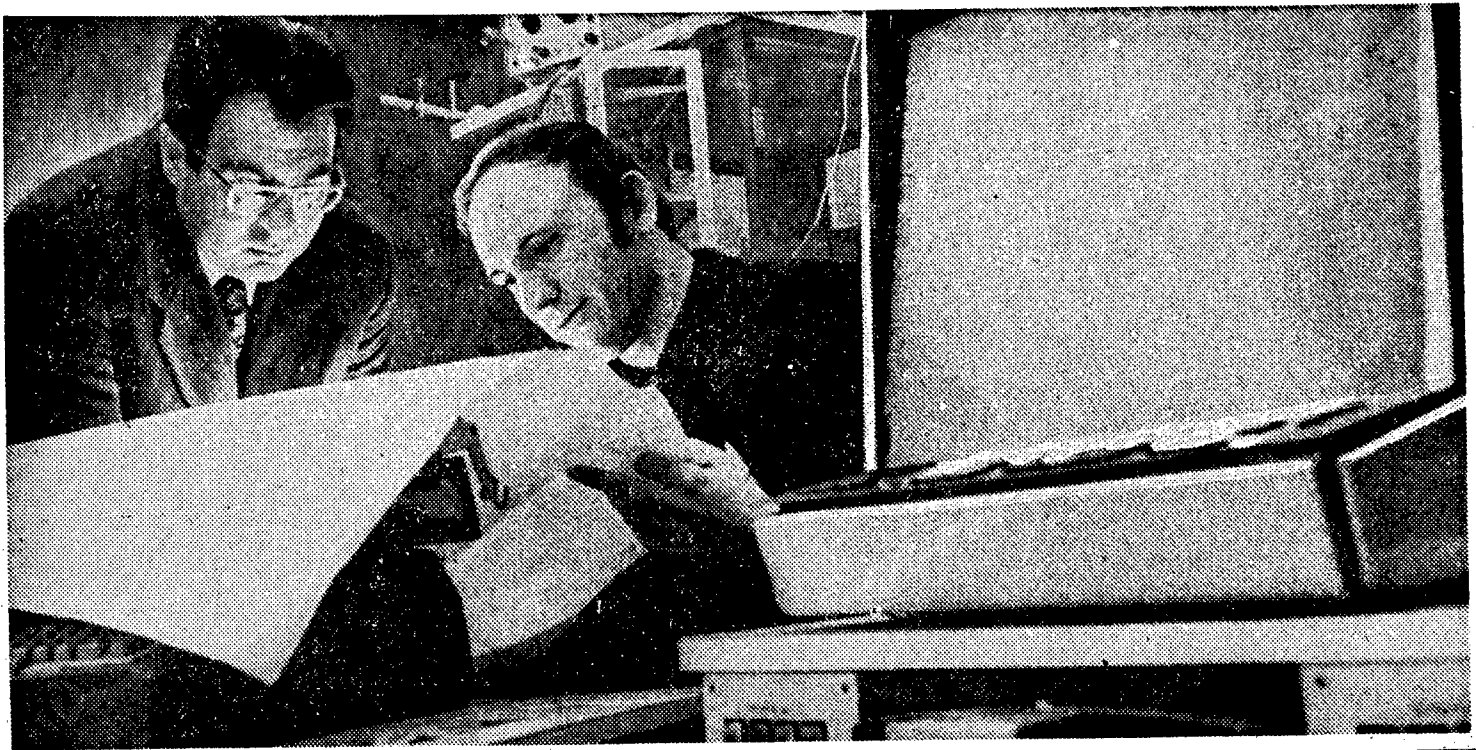
[Summary] The Institute of Technical Cybernetics of the Academy of Sciences Belorussian SSR, one of the new institutions of the Belorussian republic, is working on further development of the theory and methods of automation of design and the creation of man-machine design systems based on third-generation computers. An accompanying photograph shows associates of the institute N. Yarmosh and N. Murashko developing a device for semiautomatic coding of graphic and drawing information.

1/2



USSR

PRAVDA 24 Oct 76 p 3



2/2

USSR

ORLOVSKIY, G., deputy chairman of the Coordinating Council for Automation of Design Work and Manufacture of Radioelectronic Apparatus of the Main Administration of the Ministry of the Radioelectronics Industry USSR, laureate of the State Prize USSR; and BAKHTIN, B., docent of Leningrad Mechanics Institute

#### TRAINING IN COMPUTER-ASSISTED DESIGN

Leningrad LENINGRADSKAYA PRAVDA in Russian ("The Future Begins Today")  
25 Aug 76 p 2

[Abstract] The authors discuss the importance for higher engineering schools to train students in methods of computer-assisted design work. Speaking of higher schools in Leningrad, they observe that there is an alarming lag in teaching computer-assisted design work in programs for training specialists in the field of design and technology of machine building, electromechanics and radiomechanics, and design of radio apparatus and technology of its production. It is in these areas, the authors say, that computerized systems have found the widest application, and the country has a great need for engineers capable of working on the basis of existing systems and improving them and broadening their application.

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USSR

ORLOVSKIY, G., LENINGRADSKAYA PRAVDA 25 Aug 76 p 2

The authors say that chairs at higher schools, especially those of the design-technological profile, must plan their courses to include sections on computer-assisted design of engineering constructions, and also problems related to development and operation of computerized systems for technological preparation of production. They note that a good example has been set by the Leningrad Mechanical Institute, where computer-assisted design is applied in the educational process in the section "Design and Production of Printed Circuits." Practical lessons are conducted on the basis of the industrial system for computer-assisted design work called "Avtograf." Specialists and students of the institute have developed programs for expanding the capabilities of the system "Avtograf," and these programs are being used in the design of radioelectronic apparatus at 60 production enterprises. Noting that many microcircuits now are designed exclusively by computer-assisted methods, the authors complain that educational programs in the design-technological disciplines frequently do not take this into account. They urge the council of presidents of Leningrad higher schools to submit a proposal to the Ministry of Higher and Specialized Secondary Education that educational programs for engineers must include sections on development and operation of computerized systems.

2/2

USSR

UDC 518.74

GLORIOZOV, YE. L., IVANNIKOV, A. D., SYPCHUK, P. P. and CHISTYAKOVA, V. I.

A TECHNIQUE FOR DEBUGGING A SET OF PROGRAMS FOR TOPOLOGICAL DESIGN OF MDS ICs FOR A GIVEN MANUFACTURING PROCESS

Leningrad METODY MASHINNOGO PROYEKTIROVANIYA TSIFROVYKH USTROYSTV I SISTEM [Methods for Computer Design of Digital Devices and Systems, Collection of Works] in Russian, 1976 pp 93-95

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V743 by N. Balyberdina]

[Text] An examination is made of a set of programs for planning the topology of MDS integrated circuits (ICs) from a sketch presented by the designer. The problem of precise calculation of the coordinates of angle points of all regions of the microcircuit with consideration of given technological limitations and dimensions of MDS transistor channels is handled by a computer. The coordinates are calculated in accordance with the criterion of minimum area of the microcircuit and its parasitic capacitances. The essence of the proposed method of calculation consists in forming a model of the sketch of the microcircuit topology and calculating the coordinates of angle points of the integrated circuit from this model.

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USSR

GLORIOZOV, YE. L., IVANNIKOV, A. D., SYPCHUK, P. P. and CHISTYAKOVA, V. I.,  
METODY MASHINNOGO PROYEKTIROVANIYE TSIFROVNYKH USTROYSTV I SISTEM 1976  
pp 93-95

The proposed set of programs was used to design the topology from a sketch for MDS ICs made by different base manufacturing processes. The programs are written in the FORTRAN-IV algorithmic language for the DOS [Disk Operating System] of the YeS-1020 computer.

2/2

USSR

UDC 518.74

GLORIOZOV, YE. L., IVANNIKOV, A. D. and SYPCHUK, P. P.

USING A COMPUTER TO LAY OUT THE TOPOLOGY OF INTEGRATED CIRCUITS ON MDS  
TRANSISTORS OF COMPLEMENTARY CONDUCTIVITY TYPES

Novosibirsk VYCHISLITEL'NYYE SISTEMY [Computer Systems, Collection of Works]  
in Russian No 64, 1975 pp 82-93

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V701 by the  
authors]

[Text] The paper examines a technique for computerized design of integrated circuit topology with MDS transistors of complementary conductivity types. The procedure is based on an iterative principle. A preliminary sketch is made by the designer, and the computer takes care of calculating the coordinates of node points and analysis of topology. The algorithms developed for handling these jobs are realized as a program package. The proposed technique is illustrated by an example of design of the topology of a memory cell made from complementary MDS transistors.

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VAKHNOV, R. S., LAZAREV, A. I. and MYASIN, O. F.

EXPERIENCE IN USING A TABLE LANGUAGE [TO] TO DESCRIBE LOGIC AND SCHEMATIC DIAGRAMS

Leningrad METODY MASHINNOGO PROYEKTIROVANIYA TSIFROVYKH USTROYSTV I SISTEM [Methods for Computer Design of Digital Devices and Systems, Collection of Works] in Russian, 1976 pp 99-101

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V719 by N. Balyberdina]

[Text] It is noted that the maximum effectiveness of a system for automated design of computers is achieved when a unified input language is used to describe logic and schematic diagrams. A language of this kind is TO, which has a tabular form. The paper presents fragments of the syntax and semantics of the TO language. The translator for the TO language is realized in program form in the PL/1 universal programming language within the YeS unified system of computer facilities. This translator is used for a syntax check of the description, and to construct an internal representation of the diagram description in the form of "chains" (a chain is an output contact and list of connections to input contacts of an IC).

1/1

## II. ECONOMIC APPLICATIONS

### A. General Treatment

USSR

#### THE DEVELOPMENT OF AUTOMATED CONTROL SYSTEMS

Moscow EKONOMICHESKAYA GAZETA in Russian No 37, Sep 76 p 1

[Excerpt] At the start of the Tenth Five-Year Plan there were 789 ASU's [automated control systems] for production processes, 989 ASU's for enterprises, and 692 ASU's for territorial agencies in operation in the country. In addition, ministries and departments had 187 ASU's and 121 automated data processing systems. In all, a total of 2,778 ASU's were in operation: 414 built in the Eighth Five-Year Plan and 2,364 in 1971-1975.

Growth in the Number of Automated Control Systems (at year's end)

1970	414
1971	579
1972	835
1973	1,271
1974	1,918
1975	2,778

In the Tenth Five-Year Plan special attention is being devoted to introducing ASU's for technological processes. Along with this there will be further  
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USSR

EKONOMICHESKAYA GAZETA No 37, Sep 76 p 1

development of ASU's for sectors of industry, and automated systems of nation-wide importance will be set up: for planning calculations (the ASPR), state statistics (ASGS), USSR Gosbank, the USSR State Committee on Standards, the State Committee on Science and Technology, and others.

The Development of Various Types of ASU's

	1966-1970	1971-1975
ASU's for Technological Processes	170	619
ASU's for Enterprises	151	838
ASU's for Territorial Organizations	61	631
ASU's of Ministries and Departments	19	168
ASOI's (Automated Data Processing Systems)	13	108

During the Tenth Five-Year Plan the technical base of the ASU's will be greatly expanded. The production of automation instruments and equipment is to increase 60-70 percent, and computer production will rise 80 percent. Instrument making workers have been given the job of developing the production of general-purpose and control computing complexes, peripheral equipment, instruments, and data recording and transmitting devices for ASU's for production processes and management in the sectors of the national economy.

2/2

USSR

ABDULLAYEV, B., Candidate of Historical Sciences, docent of the Chair of Scientific Communism of the Azerbaydzhan Pedagogical Institute imeni Ch. Il'drym

#### SOME STATISTICS ON COMPUTER CENTERS AND AUTOMATION

Baku VYSHKA in Russian ("The Scientific-Technical Revolution and Communist Construction") 5 Nov 76 pp 2-3

[Abstract] The first part of this article describes in general terms the achievements made in the USSR national economy thanks to the CPSU's role in guiding scientific-technical revolution. Among other things, the article notes that at the beginning of last year there were approximately 1500 computer centers of various types in operation throughout the USSR. During the ninth five-year plan, 2,328 automated control systems were created, as compared with 414 during the eighth five-year plan. The basic trends for the development of the national economy during 1976-1980 (the 10th five-year plan) call for an increase in the output of automation equipment and instruments by 1.6-1.7 times and a 1.8 increase in the output of computer technology resources.

The second half of the article discusses the development of the national economy of the Azerbaydzhan SSR, noting both achievements and problem areas.  
1/2

USSR

ABDULLAYEV, B., VYSHKA 5 Nov 76 pp 2-3

For example, at the beginning of the current year there were 77 comprehensively mechanized and automated enterprises in the republic, as well as 782 comprehensively mechanized and automated sections, workshops, and factories [proizvodstva]. In the past few years approximately 20 information-computer centers have been established, and 72 computers and 13 automated control systems have been put into operation. However, as was noted at the XXIX Congress of the Azerbaydzhan Communist Party, the general level of work on the acceleration of technical progress and understanding of its significance is still far from completely satisfying the interests and goals of the development of the republic's economy. The republic now possesses 1,300 units of automation and mechanization equipment, which is 1.5 times greater than during the eighth five-year plan, but 90 percent of all mechanized and automated lines belong to only four sectors of industry (machine building, industrial construction materials, light industry, and the food industry). The introduction of this type of equipment into subsidiary industry is not satisfactory.

2/2

USSR

GLUSHKOV, V., Director of Institute of Cybernetics, Academy of Sciences  
Ukrainian SSR

GLUSHKOV REPORTS ON 25TH PARTY CONGRESS

Moscow NAUKA I ZHIZN' in Russian ("A Powerful Impulse") No 4, 1976 pp 6-7

[Abstract] The author, a delegate to the 24th and 25th Party Congresses, reports on the 25th Congress. The Congress defined the key problems in the development of the Soviet economy, including acceleration of scientific and technical progress. A special section of Brezhnev's report concerned the control of the economy. It was emphasized that administration and particularly planning should be directed toward definite economic results. Another trend is more intelligent utilization of economic stimulus and levers. Other important elements in the improvement of leadership of the economy are improvement of quality of products, improvement of the organizational structure and methods of administration, more extensive use of program controlled devices and broader introduction of computers.

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## CZECHOSLOVAKIA

DRAB, Zdenek, Research Institute for Iron Metallurgy, Prague

### SYSTEMS ENGINEERING IN CZECHOSLOVAKIA

Prague AUTOMATIZACE in Czech Vol 19, No 7, 1976 pp 179-183

[Abstract] The designation of "Systems Engineering" in the Czech language covers a field which is quite different from the fields covered by this designation either in the West or in the so-called Socialist countries. By this term the Czechs mean the application of computer techniques to various sciences, control agencies, government, and education. It also covers computer control of industrial production and computer control and solution of problems in economics. Nine different fields of application of these methods are reviewed in the article: industrial production, civil engineering, communication and transportation, education, medical science, pollution control, economic and social problems, design and construction, and computer technology. In the industrial field, systems engineering in Czechoslovakia is concerned with designing control problems for mines, for operation of power plants, control of complete metallurgical enterprises, special operations in machinery production, operation of oil refineries, simulation of chemical processes and preparation of mathematical models of

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## CZECHOSLOVAKIA

DRAB, Zdenek, AUTOMATIZACE Vol 19, No 7, 1976 pp 179-183

chemical production steps, and development of computer controls for highly complicated chemical processes. This branch of science is taught at the Technical University of Brno, and at the College of Chemical Engineering in Prague. In civil engineering this branch of science is used in the various design phases of construction projects. In communications and transportation it is used to develop time tables for aviation, railroads, and road transportation. It is used in airfield design, flight controls, booking of tickets, logistics of supplies, and design of unitized transportation systems, as well as in automation of communication centers. In education it is used to develop the teaching of cybernetics, improve the teaching programs of the universities, to train government employees concerned with supervising of the population. Postgraduate courses for the education of scientific workers are under preparation. In medical services the science of systems engineering is used to organize services and control medical supplies. In environmental protection it is used to monitor noxious chemicals discharged from manufacturing facilities, evaluate the impact of human activities on natural resources, and also to develop plans for maintaining a healthy environment. In economics it serves in the development of overall economic plans. In design and

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CZECHOSLOVAKIA

DRAB, Zdenek, AUTOMATIZACE Vol 19, No 7, 1976 pp 179-183

construction it is used to evaluate new designs and their impact on other sectors of industry, and in preparation of economic evaluations of newly planned production and administrative facilities. In computer technology it serves to develop means of overall computer control technologies for industrial production. In general, systems engineering is concerned both with existing and with planned facilities. The main fields of systems engineering are in mathematics, cybernetics, and biology, where future efforts should be concentrated. References: 1 Czech.

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## B. Overall Planning Methods

USSR

MOISEYEV, N., corresponding member of the Academy of Sciences USSR, Moscow

### COMPUTERS IN THE DESIGN OF LARGE SYSTEMS

Moscow PRAVDA in Russian ("Computers at the Service of Designers") 21 Jul 76  
p 3

[Abstract] Moiseyev discusses problems of application of computer systems for planning large, complex projects. An example of such a project is the study of possibilities of diverting part of the flow of northern and Siberian rivers into the European part of the USSR and Central Asia. Moiseyev says that the elaboration of this project using traditional methods is impossible. It will be possible only through methods of systems analysis using computers of new generations. This also holds true for the development of airplanes or space systems of the near future, Moiseyev says.

Observing that conditions for development and application of systems for computerization of planning are on the whole favorable, Moiseyev says that progress on them has not been great. He believes this to be mainly a result of problems of a psychological and organizational nature. First of all, few organizations understand the difficulties that must be overcome before systems for computerized planning based on third-generation computers will  
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USSR

MOISEYEV, N., PRAVDA 21 Jul 76 p 3

produce desired results. Regarding technical problems, Moiseyev observes that many persons complain about the inadequacy of existing computer technology, and look anxiously ahead to more powerful systems with well-developed peripheral equipment. In this connection, Moiseyev defends existing computer technology, stating that experience has shown that the BESM-6 computer with standard peripheral equipment is adequate for the most complex systems for computerized planning.

Other problems involve training specialists for operation of computers and systems programmers. The latter are trained primarily at the Moscow Physical-Technical Institute and the universities of Moscow and Leningrad. Moiseyev urges the USSR Ministry of Higher and Specialized Secondary Education to provide for courses for training systems programmers at other higher schools. The greatest personnel need, however, is for planners (proyektirovshchiki) themselves, whom Moiseyev calls the architects of systems for computerized planning. They must be able to work hand in hand with designers, and to describe proposed projects in mathematical language. Moiseyev says that there is not a single school in the country that trains this type of specialist.

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USSR

MOISEYEV, N., PRAVDA 21 Jul 76 p 3

Moiseyev points out that there is advanced experience in the area of computerized planning systems which should serve as a basis for future work. The examples cited are work by the USSR Academy of Sciences' Computer Center for the "Tyumen'neftegaz" organization on planning the exploitation of oil fields in Western Siberia; work by the cybernetics institutes of the Ukrainian and Belorussian academies of sciences on computerized planning of engineering systems; regional development programs for the Northwest being planned by the USSR Academy of Sciences' Leningrad Computer Center; and work on the creation of methods of planning large ecological-economic systems by the Institute of Mathematics and Mechanics and the Institute of Ecology of Plants and Animals of the USSR Academy of Sciences' Urals Research Center.

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USSR

UDC 658.012.11.56:681.3.008

YERMAKOVA, G. I., engineer

SELECTION OF CRITERIA FOR EVALUATION OF THE QUALITY OF FUNCTIONING OF THE MAIN COMPUTER CENTER OF A BRANCH AUTOMATED MANAGEMENT SYSTEM DURING PLANNING OF THE SUPPORT PORTION OF THE AUTOMATED MANAGEMENT SYSTEM FOR THE BRANCH

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 7, 1976 pp 7-10

[Abstract] A study is made of existing and possible criteria for the quality of automated management systems for branches of industry and the support portion of such a system, their relationship and dependence on their component elements. The study is done in sequence, beginning with the metasystem. The operation of the main computer center is evaluated on the basis of the timeliness and reliability of processing of information traveling within the system.

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## C. Manufacturing and Processing Industries

USSR

UDC 681.3:51.007

RUDNEV, K. N., Minister of Instrument Building, Automation Equipment and Control Systems USSR

### THE AUTOMATED MANAGEMENT SYSTEM FOR THE INSTRUMENT BUILDING SECTOR AND PROSPECTS FOR DEVELOPMENT OF SECTORIAL AUTOMATED MANAGEMENT SYSTEMS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1976 pp 1-3

[Abstract] The conditions of development of the USSR Ministry for Instrument Building Automation Equipment and Control Systems are discussed, particularly as they relate to the utilization of the ASU-pribor automated management system for the sector of industry. A number of administrative functions in the area of long-range planning of development of the sector or branch, current production planning, determination of needs for materials for production, normalization of operating capital, checking of the production-economic and financial activity, accounting and analysis of labor resources and operational administration of the branch have been automated. The first stage of ASU-pribor was put on stream in 1970, using second generation computers at the Main Computer Center and a network of multiple-user [literally "cluster" or "group"] information and communication points equipped with teletype devices. The second stage of ASU-pribor, which is based on  
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RUDNEV, K. N., PRIBORY I SISTEMY UPRAVLENIYA No 1, 1976 pp 1-3

third-generation computers, has now been put on stream. The five-year plan for the entire branch of industry is produced as a result of an iterative process of construction of the plan, during which the output of products of the branch is brought ever closer to the output required by national economic needs considering the priorities of groups of instrument building products, by redistributing the resources of individual unions without changing the total production resources of the entire branch. One of the principles of independent financing and amortization of the branch is the affirmation of branch norms for long-term operation (relating to income and wage funds, etc.). Annual plans are based on optimal production plans. The entire operation of supervision of meeting the norms of the industry is automated. The annual consumption of fuel and power resources is determined by multifactor regression analysis. Considerable attention has been given to the automation of the administration of financial resources. To control labor resources, the Ministry receives quarterly predicted estimates of wage expenditures, increases in productivity of labor and mean wages, requirements of the branch as to specialists with various levels of education and other information for analysis of the wage structure from the computer. The Main Computer Center provides the Ministry with information on the course of construction of important projects. Many processes having to do with transportation within the branch have also been automated.

USSR

UDC 681.3:51.007

ADAMOV, P. G., Chief of the Production Administration, Ministry of Instrument Building, Automation Equipment and Control Systems USSR, ZALEVSKAYA, L. V., SAAKOV, V. A., FROLOVA, V. I. (engineers)

OPERATIONAL ADMINISTRATION OF THE BRANCH OF INDUSTRY WITH ASU-PRIBOR ON STREAM

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1976 pp 8-10

[Abstract] One of the most important subsystems in ASU-pribor is the operational administration subsystem, providing for timely provision of operational information concerning the production and economic activity of enterprises (organizations), subbranches and the branch of instrument building as a whole to administrators and employees of the Ministry. The primary elements in the operational administration subsystem include the apparatus at the Ministry, nationwide unions, the Main Computer Center, enterprises and organizations in the branch. Information points and multiple-user information points provide for teletype communications between individual organizations and the main computer center. The information files of the subsystem are organized on computer discs. The results of the solution of problems by the subsystem are output as forms for each nationwide union and the Ministry, which are provided for the information consumers. In all, over 80 different  
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USSR

ADAMOV, P. G., ZALEVSKAYA, L. V., SAAKOV, V. A., FROLOVA, V. I., PRIBORY I SISTEMY UPRAVLENIYA No 1, 1976 pp 8-10

output forms are produced by the subsystem. The software of the subsystem is developed for the M-4030 computer and the ASVT disc-based operating system. Two M-4030 computers utilizing common memory and disc and tape storage are used to run the subsystem. A block diagram of the organization of the subsystem is presented. Communications between the computers and information sources and information users are implemented by the Ekran-M system for remote presentation of data. The screen consoles of the system operate in a dialog mode. The subsystem has been of significant aid in reducing shortages of important materials and individual plans.

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USSR

BUYANOVSKIY, L. A., Candidate of Technical Sciences and TELEGIN, N. A., Chief of the Planning and Economic Administration, Ministry of Instrument Building, Automation Equipment and Control Systems USSR

#### THE SUBSYSTEM FOR TECHNICAL AND ECONOMIC PLANNING

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1976 pp 6-8

[Abstract] The purpose of the subsystem for technical and economic planning is to develop optimal annual production plans directed toward more complete and economical utilization of the resources of enterprises and achievement of optimal technical and economic indicators for subbranches and the branch of industry as a whole. The subsystem also analyzes the fulfillment of plans for the Ministry of Instrument Building, Automation Equipment and Control Systems USSR as a whole in the cross section of unions and enterprises. The subsystem functions at three levels of control (ministry, nationwide union, enterprise) and includes the following main complexes of tasks: calculation of the optimal plan for production of a subbranch and the basic technical and economic indicators, calculation of optimal production plans for enterprises, calculation of the main technical and economic indicators of production plans of enterprises, determination of 1/2

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BUYANOVSKIY, L. A., and TELEGIN, N. A., PRIBORY I SISTEMY UPRAVLENIYA No 1, 1976 pp 6-8

the production capacity of enterprises and analysis of the fulfillment of annual and five-year plans. Methods used for each of these calculation objectives are briefly outlined.

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USSR

UDC 681.3:51.007

VELIKOTSKIY, A. N., MARSHAK, V. D. (Candidates of Economic Sciences), GEL'MAN, A. YE., ZIL'BER, A. V., and CHEPURENKO, V. L. (engineers)

AUTOMATION OF THE PROCESS OF FORMATION OF LONG-RANGE PLANS FOR DEVELOPMENT OF A BRANCH OF INDUSTRY

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1976 pp 3-6

[Abstract] The experience of development and industrial operation of long-range industry-wide planning subsystems as a part of the first stage of the automated management system AUS-pribor for the instrument-building branch of industry has convincingly emphasized the singular importance and high effectiveness of development of strategies for expansion of the production of instruments for the long term by means of computers. This method has allowed a number of interrelated trends in further development of the organizational-economic, information, mathematical and technical support of this subsystem to be determined. Calculations for the formation of long-range plans for development of the branch are performed in the subsystem each year, each time for the upcoming five years. Thus, the process of planning in the subsystem is continuous, allowing timely consideration of variations caused by the actual situation from the initial plan composed and approved at the 1/2

USSR

VELIKOTSKIY, A. N., MARSHAK, V. D., GEL'MAN, A. YE., ZIL'BER, A. V., and CHEPURENKO, V. L., PRIBORY I SISTEMY UPRAVLENIYA No 1, 1976 pp 3-6

beginning of the five-year plan. The composition of five-year plan indicators for 1976-1980, developed by various methods for a number of unions of the Instrument Building Ministry, shows that under identical conditions and limitations and with identical initial data, the plans formulated in the subsystem are 6 to 13% more effective than the plans developed by traditional methods.

USSR

UDC 007.5:621.38

PROLEYKO, V. M.

WORK EXPERIENCE OF THE ELECTRONICS INDUSTRY IN DEVELOPING A SYSTEM FOR  
CONTROLLING PRODUCTION QUALITY

Moscow STANDARTY I KACHESTVO in Russian No 5, 1976 pp 3-11, 92, 95

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G372 by  
V. K. Pryanikova]

[Text] An examination is made of the basic principles of developing a sector-wide system of quality control in the electronics industry; the structure of the system is described along with certain basic working areas in development and introduction. The program-goal method of planning was used for solving a variety of problems in the process of developing the system, and three groups of programs are defined: programs for elaboration of general sectoral problems such as standardization, metrology, quality planning, quality evaluation and stimulation, certification of goods and technological processes, setting up an automated sector-wide reference data system on quality, etc.; programs for development and introduction of standard production quality control systems for enterprises of various types

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USSR

PROLEYKO, V. M., STANDARTY I KACHESTVO, No 5, 1976 pp 3-11, 92, 95

(series production plant with design office, a research institute with plant, technical production association, scientific production association); five-year programs of quality improvement for each of the types (classes) of items of electronic equipment. Development of the integrated quality control system was handled simultaneously on the following levels: sector (ministry); scientific production association; research institute with plant; series production plant.

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USSR

UDC 62-50:007.5

SAVIN, A. I. and SHERESHEVSKIY, A. S.

PRODUCTION QUALITY CONTROL IN THE PROCESS OF MAKING ITEMS OF ELECTRONIC EQUIPMENT

Moscow STANDARTY I KACHESTVO in Russian No 5, 1976 pp 28-30, 92, 95

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G373 by V. K. Pryanikova]

[Text] The paper presents basic principles, methods and means used in enterprises of the electronics industry to set up a standardized automated system for quality control of goods during production. This system is a subsystem of the automated enterprise management system. A great deal of automatic and semi-automatic monitoring equipment has been developed and introduced in the sector that is distinguished by the novelty of technical solutions, high productivity, precision and reliability.

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USSR

UDC 62-52:007.5

YUDIN, B. V.

AUTOMATED SYSTEM OF PRODUCTION QUALITY CONTROL

Moscow STANDARTY I KACHESTVO in Russian No 5, 1976 pp 44-46, 92, 95

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G374 by V. K. Pryanikova]

[Text] The paper characterizes the basic functions and jobs of the "Kachestvo" automated system for production quality control developed in the electronics industry, and also fundamental ways for further development and improvement. The hardware of the "Kachestvo" system includes two M-222 computers with the regular set of external devices, keypunch equipment, a UV-1000 display, an NML-67 magnetic tape store with coupling units, an auxiliary magnetic drum and auxiliary magnetic tape storage units. The basis of the special software is the "SINKHRON" system of information storage, processing and data accumulation developed at the Institute of Applied Mathematics of the Academy of Sciences USSR for machines of the M-20 class. Figures 2; References 5.

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USSR

UDC 681.3:66.012

GITERMAN, E. M., LUZHKOV, YU. M., NUYKIN, N. K., PANOV, V. I., PINKHUSOVICH, R. L.

THE PO/MP-8000 SOFTWARE-HARDWARE COMPLEX

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No. 7, 1976 pp 56-57

[Abstract] At the Exhibition of Achievements of the National Economy in the "Chemical Industry" Pavilion, an exhibit entitled "The Chemical Industry Working for the National Economy" was held from January through May. One object displayed was a software-hardware complex, the PO/MP-8000, intended for use in chemical and petrochemical process control systems. The device includes a system of standardized modules, the MP-8000, which can be used to make up a control panel for any specific process. The control panels can operate with the "Videotone 1010V," YES-1010 and M-6000 computers. The process control system can include up to 1024 analog signal sensors, up to 500 proportional type actuating mechanisms and up to 2048 two-position actuating devices. The PO-8000 program system is intended for processes of regulation, testing and control in the chemical industry utilizing the "Videotone 1010V" computer and the MP-8000

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USSR

GITERMAN, E. M., LUZHKOV, YU. M., NUYKIN, N. K., PANOV, V. I., PINKHUSOVICH, R. L., PRIBORY I SISTEMY UPRAVLENIYA No. 7, 1976 pp 56-57

system. The following sets of programs are included: real time supervisor, reception, regulation, control, analysis, panel, print, synthesis and a general mathematical program. Each of the program sets is briefly described.

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USSR

SKURIKHIN, V., corresponding member of the Academy of Sciences Ukrainian SSR

DEVICE FOR THERMAL ANALYSIS OF CARBON IN MOLTEN STEEL DEVELOPED BY INSTITUTE OF CYBERNETICS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian ("Precise Analysis")

9 Oct 76 p 4

[Abstract] A unique device for automating the thermal analysis of carbon in molten steel has been developed at the Ukrainian Academy of Sciences' Institute of Cybernetics. The design of the device, called "Uglerod," was based on the simplest components of a digital computer. The device has neither memory nor complex control system, which made it possible to have small dimensions, operational reliability, and easy maintenance. The "Uglerod" is a digital analyzer, providing the results of its measurements in a digital form which can be readily utilized in the automated control system for the steel-melting process.

The principles incorporated in the design of "Uglerod" are also applicable for other technological processes. In particular, scientists are at present developing a digital device called "Gradus" for measuring the temperature of 1/2

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SKURIKHIN, V., SOTSIALISTICHESKAYA INDUSTRIYA 9 Oct 76 p 4

molten steel. The same principles can serve in the construction of devices for determining the carbon equivalent in molten iron for the metallurgical and machine building industries, and for identifying impurities in non-ferrous metals.

USSR

SMELYANSKIY, S., special correspondent of Sovetskaya Rossiya

REPORT FROM THE AUTOMATED COMPUTER-CONTROLLED MACHINE TOOLS SECTOR

Moscow SOVETSKAYA ROSSIYA in Russian ("Bold Search: A Report from the Automated Machine Tools Sector Which is Controlled by a Computer") 25 Sep 76  
p 1

[Abstract] The article reports on a computer-controlled machine tool sector at the "Stankokonstruktsiya" Experimental Plant of the Experimental Scientific Research Institute of Metal-Cutting Machine Tools. Development and implementation of the computer-controlled machine tools is said to be one of the most important directions of the work of the institute during the 10th 5-year plan. The sector has 14 machine tools and seven operators producing at a level equal to 140 manually-controlled machine tools. Analysis has shown that the downtime for machine tools undergoing repair in the sector is half as much as for machines with digital program control which operate autonomously, outside the integrated production process.

According to Lev N. Grachev, one of the leading designers of the sector and head of the institute's department of lathes and automatic machines, the sector is a prototype for future production processes.  
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USSR

NIKONOV, S.

INDUSTRIAL ROBOT DEVELOPED AT AVIATION INSTITUTE

Moscow IZVESTIYA in Russian ("The Furnace's Robot") 1 Oct 76 p 2

[Summary] A second-generation robot developed by the Leningrad Institute for Building Aviation Instruments has given excellent results. The robot, which is designed to service hardening furnaces, can locate a heated part having the required shape from among the other parts in the furnace, remove the part, and place it in an oil bath. The "fingers" of the robot's "hand" are equipped with light-sensory elements, which help it determine if the part is properly grasped in the hand. The robot also has tactile sensors which react to touch. The hand has eight degrees of freedom and can alter its degree of exertion.

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USSR

UDC 621.9 : 681.3.06

KISILEVSKIY, F. N., SPYNU, G. A., Doctors of Technical Sciences; SHVYDSKIY, N. R., Candidate of Technical Sciences, and CHERNYSH, N. V., engineer

GROUP CONTROL OF INDUSTRIAL ROBOTS IN WELDING

Kiev MEKHAIZATSIIYA I AVTOMATIZATSIIYA UPRAVLENIYA in Russian, Izd-vo UkrNIINTI, No 4, Jul-Aug 76 pp 48-52

[Abstract] Questions of computerized group control of lines of industrial robots are examined. The results of development of a system of group control of lines of industrial robots to automate the contact spot welding of motor-vehicle parts using the UVK M-400 control computer complex and the IES-G90 industrial robots are described. Functions performed by the group control system are enumerated. References 5: all Russian; Photographs 2.

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USSR

UDC 518.74

SHCHERBIN, A. M.

A SET OF PROGRAMS FOR SOLVING THE PROBLEM OF SUPERVISING THE IMPLEMENTATION OF PLANS FOR SEASONAL MEASURES TO IMPROVE RELIABILITY OF EQUIPMENT OPERATION IN THE FACILITIES OF ELECTRIC POWER NETWORKS

Tashkent ALGORITMY I PROGRAMMY [Algorithms and Programs, Collection of Works] in Russian No 25, 1976 pp 42-54

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V807]

[Text] This set of programs is written for third-generation computers of the YeS series [Unified System] in PL/1 language. Provision is made for programmed divisions of the information flow by seasons, checking the validity of input data and daily correction of results. The set of programs runs for 2-3 minutes.

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POLAND

UDC 658.562.011.56:681.32.004.14 IFAC 5.6.3.6

MALCZYNSKI, Krzysztof, M. A., Engr., and SZYMANSKI, Pawel, M. A., Engr.;  
"Chemoautomation" Departmental Research-and-Developmental Center of the  
Automation of Chemical Processes

FUNCTIONS PERFORMED BY A COMPUTER SYSTEM FOR AMMONIA PRODUCTION PROCESS  
CONTROL

Warsaw POMIARY AUTOMATYKA KONTROLA Vol 22, No 9, Sep 76 CHEMOAUTOMATYKA, in  
Polish, pp 33-36

[Abstract] The authors describe the functions performed by an autonomic  
computer system installed at the Wloclawek Nitrogen Plant for the ammonia  
production process control. These functions are as follows:

1. The computer reads out all analog measurements (500), processes engineering correction data signals ( $^{\circ}\text{C}$ ,  $\text{Nm}^3/\text{h}$ ,  $\text{KG}/\text{cm}^2$ , etc), effects digital noise filtering, investigates scatter of the measurement signal, verifies limits of the range of measuring device and prints the pertinent information for the operator;
2. it calculates the values of variables measured indirectly, such as steam/coal ratio,  $\text{H}_2/\text{N}_2$  ratio, equilibrium temperatures of the reaction, 1/2

POLAND

MALCZYNSKI, Krzysztof, and SZYMANSKI, Pawel, POMIARY AUTOMATYKA KONTROLA  
Vol 22, No 9, Sep 76, CHEMOAUTOMATYKA, pp 33-36

contents of components in the stream, utilizing balanced and physicochemical dependencies, and averages measurements;

3. it reads out digital T inputs of power counters (kwh); logging may include: cyclic recordings of the full data, one hour or on demand; partial recordings relative to individual nodes, and the recording of the trend for a limited number (20) of variables;

The computer also ensures the control of various alarms, balances daily production and calculates its relevant indices, verifies and squares measurements data, and performs a number of other functions of which the most important are: the local on-line optimization, including reforming, CO conversion, Benfield process, and  $\text{NH}_3$  synthesis reactor.

The appended block-diagram presents the hardware of the system.

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#### D. Power System

USSR

UDC 62-52.001.13:621.31

DUEL', M. A., KHAIT, YA. G. (Candidates of Technical Sciences)

SELECTION OF THE STRUCTURE OF THE AUTOMATIC CONTROL SYSTEM FOR A POWER UNIT OF A THERMAL ELECTRIC POWER PLANT

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1976 pp 13-15

[Abstract] The automated control system [ACS] of a thermal electric power plant must be considered one of the primary subsystems of the automated management system of a power union and, in the near future, the automated management system of the entire branch of industry. The primary subsystems of a thermal electric power plant automatic control system include the ACS for a power unit, which performs all of the tasks involved in technological control of the power unit and is the lowest level in the hierarchy of the power plant ACS. The functional structure of a power unit ACS and an information model of the hierarchical structure of the ACS for a power unit are presented, illustrating the method by which the ACS provides for satisfaction of the demands of power consumers while minimizing the cost of power production. It is suggested that the most efficient basis for a power unit ACS is a minicomputer, utilizing direct digital regulation of the power unit.

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## E. Transportation System

USSR

UDC 658.012.011.56:656.2

KULAYEV, K. V., Main Administration of Computer Technology, Candidate of Technical Sciences and PETROV, A. P., Head of the Department of Computer Technology of Central Scientific Research Institute, professor, Doctor of Technical Sciences

### AUTOMATED RAILROAD TRANSPORT CONTROL SYSTEMS IN THE TENTH FIVE-YEAR PLAN

Moscow ZHELEZNODOROZHNIY TRANSPORT in Russian No 8, 1976 pp 39-47

[Abstract] The 25th Party Congress called for further development and increased effectiveness of automated management systems and computer centers. During the past five years, a number of effective computer centers and automatic control complexes have been introduced on the nation's railroads. The material basis for computer centers has increased. During the five-year plan, 82 computers of moderate capacity and 1000 points for reception and transmission of information to and from computer centers have been put on stream. The standardization of technological information and software have allowed the work volume performed by computer centers to grow much more rapidly than personnel employed in them. In the tenth five-year plan, automated railroad control systems must be not simply expanded but prepared to leap forward to a new qualitative level based on third generation

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USSR

KULAYEV, K. V., and PETROV, A. P., ZHELEZNODOROZHNIY TRANSPORT No 8, 1976 pp 39-47

computers and standardized systems including development and introduction of standard plans at the ministry, railroad, sorting station and junction level, requiring the installation of two or three unified series (YES) computers at each computer center and the corresponding development of data transmission equipment. Photographs are presented of a sparkling computer room and impressive control panel, plus data transmission equipment, alpha-numeric printers and automated railroad ticket location [not reproduced]. During the tenth five-year plan, third generation computers will be introduced and the Minsk-32 and Ural-14D computers presently in use will continue to be used. Each computer center will require three or four computers capable of speeds of 0.2-0.5 million operations per second, with memory capacities of 512 kilobytes, 6 disc drives with high-capacity discs, approximately the same number of magnetic tape drives, and the corresponding number of input and output devices. A group of specialists has been organized at the main administration for computer technology to solve problems related to software. The operating system for railroad automated management systems is to be the OS/YES 4.0 which can operate over teletype lines. This operating system

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USSR

KULAYEV, K. V., and PETROV, A. P., ZHELEZNODOROZHNIY TRANSPORT No 8, 1976  
pp 39-47

must be strictly used as the standard to assure compatibility among railroads. During the first years of the five-year plan, the YES-1033 and YES-1022 will be used. The YES-1022 must be used with at least 256 kilobytes of memory, four disc drives and two printers. A typical sorting station will be equipped with a YES-1010 computer. The speed of this machine, however, is insufficient for large sorting stations, where at least two YES-1022 or one YES-1033 and two or more computers to control the actuating processes will be used. The Express-2 system will utilize a high-speed YES system computer, planned for production during the second half of the tenth five-year plan. Railroad automated management systems must be developed in close cooperation with branch automated management systems for other types of transport. Obviously, the single transport system the country requires an equally unified automated management system, consisting of a coordinated complex of automated management systems of all types of transportation.

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USSR

DENISOV, V. I., Deputy Chief of Main Administration for Computer Technology,  
Ministry of Railroads USSR

#### COMPUTER TECHNOLOGY IN A NEW STAGE

Moscow AVTOMATIKA, TELEMEXHANIKA I SVYAZ' in Russian No 5, May 76 pp 2-4

[Abstract] During the ninth five-year plan, extensive work was done on the development and introduction of computer technology to railroad transport. Some 23 railroad computer centers were created, computer technology laboratories were set up on three roads, and 8 information computer centers were constructed at Railroad Ministry enterprises. They are all equipped with second generation computers, plus some third generation computers, adequate software and are intended primarily for the performance of production technology tasks. One of the main tasks to be undertaken in the tenth five-year plan is the development of a general plan for development of computer technology. The methodological and scientific administration of this development will be undertaken by the Central Scientific Research Institute of the Railroad Ministry. In order to unify and standardize data processing by the computer centers of the roads, technical assignments have been handed down for the development of standard complexes of programs

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USSR

DENISOV, V. I., AVTOMATIKA, TELEMEXHANIKA I SVYAZ' No 5, May 76 pp 2-4

and assignments. One very important problem involved in the utilization of third generation computers is timely training of personnel. By the end of 1975, over 150 programmers had attended courses to increase their qualifications. However, this is clearly not enough. Therefore, in 1976-80, annual training of three additional groups of programmers is planned. Courses will also be organized for electronic technicians and communications technicians. Courses will be organized for the roads of Siberia and the Far East in Novosibirsk. The expansion of work on the introduction of computer technology for the control of the transportation process during the tenth five-year plan will require an increase in capacity. Third generation computers will be added to the computer centers, allowing their processing capacity to be increased by a factor of 5, 80% to 85% of this capacity to be directed toward solution of technological and production-technological process problems, 10% toward the performance of organization and technological tasks. The introduction of automated management systems is being performed by stages. These stages might include an information-reference system, information-advice system, then finally an information-control system. During the tenth five-year plan, the first stage and in some cases the second stage of automatic control systems will be introduced at 35 to 40 sorting yards,

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USSR

DENISOV, V. I., AVTOMATIKA, TELEMEXHANIKA I SVYAZ' No 5, May 76 pp 2-4

3 junction computer centers for collective use will be opened and the introduction of the second stage of automated management systems of railroads will begin.

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USSR

GERVASH, A., Leningrad

COMPUTERIZED SYSTEM FOR RAILROAD FREIGHT BEING ESTABLISHED

Moscow TRUD in Russian ("The Computer Manages Shipping") 19 Sep 76 p 1

[Abstract] An automated control system for the shipping process is being set up on the October Railroad. Information on the trains being formed is sent via teletype from 107 different subdivisions, such as the Leningrad-Moscow Shunting Yard, to the computer center of the October Railroad, located in a separate new six-story building. At the computer center a description of the train is drawn up in a matter of minutes, showing its weight and length, the plan of composition, data on violations of the traffic schedule, the railroad to which each car is being sent, and the freight which each car is carrying. Without this document, the train is not permitted to begin its journey.

"The main goal which we were given," says G. L. Mikhaylov, chief of the computing center, "was to cease dealing with individual problems and to set up a comprehensive automated control system for the shipping process for the whole railroad. Already--for the first time in our country--the computer can give dispatchers upon request information on the location and status of every through train.

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USSR

GERVASH, A., TRUD 19 Sep 76 p 1

Soon passengers too will enjoy the benefits of the introduction of computers as the October Railroad is preparing to switch to fully mechanized ticket operations. The computer will store all schedules, departure times, and the number of tickets.

2/2

USSR

BONDAREVA, A., Odessa

COMPUTER CENTER AIDS RESCUE AT SEA

Moscow VODNYI TRANSPORT in Russian ("Automation Assists") 16 Sep 76 p 4

[Abstract] Associates of the Chair of Ship Theory of the Odessa Institute of Maritime Engineers together with rescue specialists recently developed the first research-information program, AS-1, for use in maritime rescue operations. In the event of an accident, the AS-1 will process information from the scene of the accident and accurately determine all the basic parameters, including the pressure of the ship against the bottom (in the case of ships run aground), damage to the hull, and other factors, after which the data are sent to the shipping line's computer center. The computer center can then make recommendations for carrying out rescue operations.

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## F. Construction

USSR

RYBAL'SKIY, V., Doctor of Technical Sciences, professor of Kiev Institute of Construction Engineering

### SPECIFICS AND PROBLEMS OF AUTOMATION OF ADMINISTRATION OF CONSTRUCTION

Moscow NA STROYKAKH ROSSII in Russian No 8, 1976 pp 26-28

[Abstract] It is often said that the first task in construction in the Soviet Union today is to achieve elementary order on the construction site and with supply of equipment and materials, then proceed to automate administration. This article argues, however, that it is precisely the disorder of supply and performance of construction that automation is called upon to combat. Many problems related to automation of the administration of construction are being attacked by the state construction commission and ministries. Whereas up until 1967 construction utilized only elementary calculators and tabulating machines, there are now over 130 computer centers with 250 computers and 6000 specialists operating them in the field of construction. A powerful branch network of information and computer centers is being set up, based on the departmental network of the construction ministries. It achieved a savings of 100 million rubles in the ninth five-year plan. Large scientific research institutes have been set up in Moscow and Kiev for the purpose of studying problems of development and introduction of automated  
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USSR

RYBAL'SKIY, V., NA STROYKAKH ROSSII No 8, 1976 pp 26-28

management systems for construction. The institutes of construction and architecture in Minsk and Tallin and many construction VUZes are working on the same problems. All ministries and many unions have successfully operating automated management sections. Automated management system engineers are being trained at the Moscow and Kiev Institutes of Construction Engineering. The cost of the automated management systems currently under construction is quite high, millions of rubles, requiring hundreds of man-hours to be spent over a period of years. This was permissible during the ninth five-year plan, when less than 5% of the total volume of construction and installation work was automated. However, the massive transition of construction to automation will require standardization of AMS plans to reduce waste. Another problem is that the specialty of "automated management system engineer" has just been created at the construction institutes, so that the first graduates cannot be expected for several years. Immediate steps must be taken to train engineers now in the system, those who will graduate sooner, in this area. Training of specialists is considered the most difficult area of automated construction management.

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USSR

DOTSENKO, V., deputy chief of the Programming Service of the Administration for ASUS [Automated Construction Management Systems] of the Order of Lenin Glavmosstroy [Main Administration for Housing and Civil Construction in the City of Moscow]; DASHEVSKIY, G., chief of a department of the Administration for ASUS; FRADKIN, M., chief of a department of the Administration for Equipment Provision of DSK-1 [House Building Combine No 1] of Glavmosstroy

# MONITORING THE FULFILLMENT OF SCHEDULES FOR PROVISION OF EQUIPMENT AND SUPPLIES BY COMPUTER

Moscow NA STROYKAKH ROSSII in Russian No 8, 1976 pp 35-39

[Abstract] The Administration for ASUS of Glavmosstroy is creating an automated system for management of the process of delivering supplies and materials to construction projects. The system, known as ASU TsPKU, is being created for the TsPKU [Central Industrial-Provision Section] of the DSK-1. It will aid in the new method of construction used by the administration, in which all materials and supplies are delivered to the construction site on an hourly schedule, so that they can be installed into the building as it is erected directly from the trucks on which they are delivered. This requires the sort of coordination and tight scheduling only possible by  
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USSR

DOTSENKO, V., and DASHEVSKIY, G., NA STROYKAKH ROSSII No 8, 1976 pp 35-39

means of computers. The administration performs all major construction operations at once, so that the building once erected, is basically complete, lacking only interior painting and finishing.

The first stage of ASU TsPKU, which was put into operation in 1975, includes mechanized operative record keeping on the delivery of materials and supplies from TsPKU to the construction site, daily monitoring of the fulfillment of schedules for provision of materials and supplies to each construction object, and updating of the schedules. The system uses a Minsk-32 computer, and computations are carried out in the evening or at night in order that all the necessary data and updated schedules may be ready by nine o'clock the next morning. All of the computer programs for the first stage of ASU TsPKU were written in COBOL. As a result of the introduction of the first stage, the quality of the provision process has been increased, the number of non-deliveries and mistaken deliveries reduced, and the expenditures of labor for the preparation of accounting and book-keeping information sharply decreased. The calculated savings resulting from the use of the first stage of ASU TsPKU is 184,000 rubles.

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USSR

ASU'S IN CONSTRUCTION

Minsk SEL'SKAYA GAZETA in Russian 15 Oct 76 p 3

[Excerpt] The construction workers of our republic [Belorussia] have accumulated positive experience in this area [introduction of automated systems and computers into construction]. The "Promstroysistema" Industrial-Technical Association and the Gomel' Multiple-User Computer Center of the Ministry of Industrial Construction Belorussian SSR have developed a complex of goals on automation of a control system for the pool of machines and mechanisms, and these goals have been adopted by the Administration for Mechanization No 11 of the Gomel' Construction Trust No 10. This has allowed the staff of the administration to reduce manual labor, improve the quality of the output information, implement rational arrangement of machines, and to analyze their use with respect to time.

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## G. Trade

USSR

ORLOV, A. V., candidate of economic sciences, GORODISSKIY, F. B., candidate of economic sciences, and KOMAROV, A. A., candidate of economic sciences

### AUTOMATED CONTROL SYSTEMS IN TRADE

Moscow ASU V TORGOVLE [Automated Control Systems in Trade] in Russian, "Znaniye" Publishing House, 1974, pp 33-34

[Excerpts] There are 19 computer centers, 12 mechanized accounting factories [fabrika mekhanizirovannogo scheta], 82 machine calculating stations [mashinoschetnaya stantsiya], and 138 machine calculating bureaus [mashinoschetnoye byuro] operating at present in state and cooperative trade organizations. Many additional organizations and enterprises use the machine calculating stations of the Central Statistical Administration USSR and other departments.

Work on the creation of automated control systems and on the introduction of computers and mathematical methods is proceeding along a number of lines. The "oldest" of these is the development of control systems for large-scale general-purpose stores and general-purpose municipal trade. These tasks are being carried out on the base of the information-computing centers of GUM [State Department Store] and "Gostinyy Dvor," which are equipped with the computers Minsk-22 and Minsk-32...

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USSR

ORLOV, A. V., GORODISSKIY, F. B., and KOMAROV, A. A., ASU V TORGOVLE "Znaniye" Publishing House, 1974, pp 33-34

Many computer centers in the trade sector are experiencing not a few difficulties due to poor software and to the lack of preparation of economic-mathematical control problems for computerized solution.

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H. Agriculture, Water Management,  
Land Reclamation, Sylviculture

USSR

COMPUTER USED TO CALCULATE FODDER MIXTURES

Moscow PRAVDA in Russian ("The Recipe is Composed by a Computer") 13 Nov 76  
p 3

[Summary] Novgorod. The mixed feed enterprises of the Novgorod Oblast Production Administration of Grain Products have switched over to the use of computers to calculate fodder mixtures. This work was previously done directly at the enterprises, where it took much time and effort, but now the calculations are performed by the Leningrad Information Computer Center. This has allowed more effective use of raw material resources, the production of exactly balanced feeds, and a savings of more than eight rubles for each ton of the product.

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USSR

COMPUTER CENTER FOR AGRICULTURAL INFORMATION BEGINS OPERATION

Moscow PRAVDA in Russian ("The Beginning of a Biography") 18 Jul 76 p 2

[Excerpt] A new computer center -- the first link in an automated system for control of agricultural production -- has gone into operation at the Kirgiz Machine Testing Station. In the photograph [not reproduced]: programmer N. Dianova and operator V. Gerner are processing the data coming in from the field camps.

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### III. SOCIOCULTURAL AND PSYCHOLOGICAL PROBLEMS

#### A. Urban Systems and Communal Services

USSR

OLEYNIKOVA, N., Moscow

#### SYSTEMS APPROACH TO CITY PLANNING

Moscow SOVETSKAYA KUL'TURA in Russian ("For the City and the City-Dweller")  
14 Sep 76 p 8

[Summary] Yesterday was the last day of the Interbytmarsh-76 International Exhibition at Solol'niki Park in Moscow. One of the largest of the Soviet exhibitors was the Academy of Municipal Services imeni K. D. Pamfilov, which displayed machines, equipment, and instruments throughout all areas of the Soviet section of the exhibition. The academy is made up of four scientific research institutes, three experimental plants, and more than 15 laboratories and departments. Each of these various subdivisions is working on certain features of the ideal city of the future, which people today are already striving towards. Ideas originated at the academy go forth to the streets and squares of cities throughout the Soviet Union.

For example, the first phase of an automated control system for water mains is in operation in Khar'kov. In Sverdlovsk, the city's electronic "brain," that is, the computer center of first stage of an automated control system for housing and municipal service, is working smoothly. The center, which  
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USSR

OLEYNIKOVA, N., SOVETSKAYA KUL'TURA 14 Sep 76 p 8

keeps records on 350 enterprises and organizations, is the point of convergence for information on the operation of hotels, bath houses, and laundries; the movement of streetcars and trolleys; the cleanliness of the streets; and the supply of water to residential buildings. Leningrad has a plant to process domestic sewage. In Moscow, an automated system to control the heat supply to buildings is being set up; it will maintain a constant indoor temperature. Automated control systems for bus traffic are to be introduced in Omsk and Alma-Ata.

On the streets of the capital not long ago a brigade of "doctors" was seen taking electrocardiograms from trees! They implanted very fine electrodes in the bark. In a couple of minutes they had analyzed how the tree "felt," reached a precise diagnosis, and prescribed appropriate treatment. The electrophysiological method of analyzing the condition of green plants developed by these scientists will soon find its way into practical use as an original kind of "scaphandre" [suit] for trees. When they dry the special substances which are sprayed on the trunk and crown of the tree form an invisible film. It lasts for 8-9 days, preventing the evaporation of moisture. Inside such a "suit" a mature tree can be transplanted, even during hot weather.

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OLEYNIKOVA, N., SOVETSKAYA KUL'TURA 14 Sep 76 p 8

"The ideal city of the future is first of all a city of great culture," says F. Shevelev, director of the academy. "This is a broad concept. It includes clean streets and greenery, convenient housing and preservation of residential buildings, precise operations by city transport and various other spheres of domestic service, questions of environmental protection, and much more. The academy is the only organization in the world which is working on these problems in a comprehensive way."

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USSR

YAMPOL'SKAYA, I., correspondent of Novosti Press Agency

#### MODELING A CITY

Yerevan KOMMUNIST in Russian 17 Sep 76 p 2

[Summary] The Institute of Socioeconomic Problems of the Academy of Sciences USSR in Leningrad is the head scientific center for development of methodology for the planning and socioeconomic development of large cities.

Scientists from diverse fields, economics, mathematics, cybernetics, sociology, psychology, and medicine, are studying the economic and social life of Leningrad. A new information and computing system, a kind of data bank for socioeconomic problems, is being created at the institute.

"Our first 'product' will be recommendations on developing the initiative and creativity of workers and employees at industrial enterprises," says Professor G. Cherkasov, director of the institute. "We have analyzed different forms of large-scale introduction of leading know-how and the prospects for economic growth and the social development of production collectives. This work is part of a large topic which we must still work out."

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YAMPOL'SKAYA, I., KOMMUNIST 17 Sep 76 p 2

"We face the job of developing a typology of the cities of our country and constructing and testing mathematical models which can be used as a basis, for example, in optimally combining the methods of sectorial and territorial planning or forecasting the development of an urban system. This is a long-range problem, but as work progresses on it the scientists of the institute will be giving interested organizations concrete recommendations on particular matters. We are now undertaking a study of the changes in the nature and content of the labor of social groups in the urban population."

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USSR

MULADZHANOV, SH.

AUTOMATED MANAGEMENT SYSTEM FOR MOSCOW UNDER DEVELOPMENT

Moscow MOSKOVSKAYA PRAVDA in Russian ("The Electronic 'Brain' of the City")  
25 Sep 76 p 2

[Abstract] The author discusses the achievements to date and future plans for the "ASU-Moskva" automated management system, which will computerize the management of Moscow's city services and development. Work on "ASU-Moskva" was begun during the ninth five-year plan and at present 22 of the eventual 50 branch subsystems are in operation. These include the transportation, construction, trade, bread baking, exchange [obmen], social security, and tourism sectors of industry.

The base of control for the entire system will be the Main Scientific Research Computer Center [GlavNIVTs] under the Moscow City Soviet Executive Committee, directed by Petr Nikolayevich Tkachenko. Modernization of GlavNIVTs is underway and a new facility on Novokirovskiy Prospekt is now under construction. In its new quarters, the center will be equipped with eight computers with a productivity ten times greater than that of its present computers.

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MULADZHANOV, SH., MOSKOVSKAYA PRAVDA 25 Sep 76 p 2

Below GlavNIVTs there will be four or five large inter-sectorial computer centers. A plan has already been developed for a widespread system of communication lines, and by 1978 specialists of "Mostelefonstroy" [Moscow State Trust for the Construction of Telephone Structures] are supposed to implement the first stage of the plan, which will unite all of Moscow's computer centers. In addition, the just established Department of Systems Software of GlavNIVTs is working on the solution of the problem of a unified method of information coding for all sectors of the Moscow municipal economy.

The "ASU-Moskva" system is scheduled to be fully implemented by 1990.

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USSR

MIKHAYLOV, B.

AUTOMATED CONTROL OF BUS AND TAXI SERVICE DISCUSSED [THE ELECTRONIC DISPATCHER]

Moscow IZVESTIYA in Russian 11 Nov 76 p 6

[Excerpt] A number of automated systems for studying the passenger flow on city bus routes have been developed and have already been introduced in various cities of our country. Here is one of them. With its help, answers can be obtained to such questions of importance to the regulation of transport work as the number of persons getting on and off at each stop or carried during the entire run, the traffic intervals can be ascertained, the amount of time spent at each stop can be determined, and much else. Electric impulses are used for this purpose, specifically those of the front and rear door monitors. The impulses flow into a discriminator, which divides the passengers into "boarding" and "exiting." The information from the pulse counter is fed into a punching device, which preserves it on punched tape. During the next stage the data may be fed into a computer, which works out recommendations for bus traffic regulation.

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USSR

MIKHAYLOV, B., IZVESTIYA 11 Nov 76 p 6

The automated control system [ASU] for city bus traffic that was worked out and introduced in Nal'chik is more sophisticated. The system consists of a transceiver, a data processing unit with a number printer, and a control panel and mnemonic display, which shows the locations of the buses. At the final and several intermediate control points, transceiver relay units are installed on the buses themselves. Coded information on the bus garage number, the route, and interruptions in relaying is automatically transmitted to the dispatcher center for monitoring and decision making. It is envisaged that in the future this system will be connected to a computer.

However, the automated taxi-control system (ASU-Taxi), which was developed by the Scientific-Research Institute for Motor Vehicle Transport, is probably of the greatest interest. We have all occasionally used this convenient and sometimes indispensable form of transport. And we have more than once stood on line at taxi stands. But here is what happens: after having "fought" to get a taxi and lost a tremendous amount of time on line, one then rides past a long string of taxis lined up on an adjacent street with their empty signals displayed, waiting for passengers. The difficulty of the taxi problem lies in the fact that once a taxi is running, or in service, the taxi driver

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MIKHAYLOV, B., IZVESTIYA 11 Nov 76 p 6

is on his own, virtually "uncontrolled," not covered by communications back and forth with the dispatcher, those invisible threads of control.

What is the main liability of today's taxi service? Most likely, the fact that on the whole only a total of five to ten percent of rides result from telephone orders. The rest are governed by "his majesty chance." Thus, ASU-Taxi, using the existing dispatcher system, should ensure a response to more than 80 percent of the orders for rides.

How will this be organized?

Two types of orders for taxis will be introduced--immediate and advance. It will be possible to place an immediate order not only from the home, but also, for a fixed advance payment, from numerous special telephones in "taxi telephone booths," which will be located at different places in the city--at stations, airports, theaters, stadiums, department stores, and in areas where prior studies have revealed a higher than usual demand for taxis. Incidentally, the developers have already developed a special taxi attachment for all telephone booths. An immediate order goes to the central dispatcher

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USSR

MIKHAYLOV, B., IZVESTIYA 11 Nov 76 p 6

station computer. The driver of a free taxi, after turning off his meter, automatically transmits information to the same computer and states the area of his location. After processing the immediate order message and information on free taxis, the computer connects the telephone from which the call was made with the radiotelephone of the closest taxi so that the passenger can give the driver his address. This takes 15 to 20 seconds.

Advance orders, which are processed by Central Dispatcher Station computer, go directly to taxi motor transport enterprises for timely fulfillment.

The introduction of ASU-Taxi is first and foremost a fight against the terrible outrage of the empty taxi run. What would an actual reduction of 10 percent in empty runs, as compared with this very day, signify? This is the task the developers of this system have assigned themselves.

Based on the assumption that by the end of the new five-year plan there will be as many as 20,000 taxis in Moscow alone, for example, if all taxis are in service and a 300 kilometer compulsory run costs 10 kopeks per kilometer, actual savings per day would amount to five to six thousand rubles, give or take a little. This is per day. And per year?

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MIKHAYLOV, B., IZVESTIYA 11 Nov 76 p 6

ASU-Taxi solves one other problem--it completely eliminates time wasted standing idle by this form of transport which essentially is designed to be in "perpetual" motion.

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USSR

UDC 62-52.001.572:53.072

DOLGONOSOV, N. S., SULIMOV, V. V. (engineers), and TSIPTSYURA, R. D.,  
Candidate of Technical Sciences

PRINCIPLES OF CONSTRUCTION OF TRAINERS FOR THE DEVELOPMENT OF REMOTE CONTROL  
OPERATOR SKILLS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 7, 1976 pp 1-4

[Abstract] In order to improve the skills of operators involved in remote control of power plants, a group of specialized devices, so-called sector trainers, has been developed. To do this, after analysis of the structure of the power unit as a whole, the main functional groups skills which required improvement were distinguished: 1) reinforcement of general technical knowledge concerning the sector, including the design and construction of equipment and its modes of operation, connection with other sectors, location and volume of test instruments, protective devices and signalling devices; 2) teaching of the workers the methods and rules for following the course of the technological process under normal and emergency conditions; 3) development of the ability to evaluate the quality of operation of automatic equipment and stabilize the parameters being regulated; 4) development of skills in remote control in various situations, skills in precise and

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USSR

DOLGONOSOV, N. S., SULIMOV, V. V., TSIPTSYURA, R. D., PRIBORY I SISTEMY  
UPRAVLENIYA No. 7, 1976 pp 1-4

economical work in regulation of parameters under distracting conditions; 5) learning of the rules and sequence of performance of actions to put supplementary equipment on stream and take it off stream; 6) development of skills in formulation of messages to superiors, replacement personnel and junior watch personnel; 7) formation of skills in diagnosis of defects and the ability to eliminate them; 8) development of skills in rapid reading of indications of instruments, differentiation of scales, rapid orientation in data streams from diagrams and measuring instruments. Photographs and diagrams of trainers designed to develop these skills are presented.

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USSR

UDC 518.74

VOSKRESENSKIY, YU. A.

SOME POSSIBILITIES OF DIALOG IN MULTIPLE-USER SYSTEMS

TRUDY INSTITUTA ELEKTRONNYKH UPRAVLYAYUSHCHIKH MASHIN [Works of the Institute of Control Computers] in Russian No 48, 1975 pp 13-15

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V779 by V. D'yachenko]

[Text] The paper describes the possibilities of dialog between subscriber terminals during the working process in a multiple-user system. Provision is made for communication between the system operator and subscriber terminals. The subscribers can get information on implementation of new capabilities in the system, request data on the state of jobs or transmit directives on introduced limitations.

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USSR

UDC 681.3:371.693

GOLYSHEV, L. K., candidate of Technical Sciences, and KUZNETSOVA, T. V., engineer

INVESTIGATION OF THE LOADING OF PERIPHERAL COMPUTER EQUIPMENT IN A DIALOG SYSTEM

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No 4, Jul-Aug 76 pp 53-56

[Abstract] An analysis is presented of the peripheral computer equipment in a dialog system using the example of a certain learning system, for which statistical data have been collected on the use of peripheral equipment in the process of learning. References 4: all Russian; Figures 7.

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BALYASNYY, L. M. and VYSHKIN, B. S., editorial staff of "Mekhanizatsiya i Avtomatizatsiya Upravleniya"

SOME PROBLEMS OF DESIGNING THE 'LIMIT' DIALOG REFERENCE DATA SUBSYSTEM FOR A SMALL COMPUTER

Kiev NEKOTORYYE OSOBENNOSTI POSTROYENIYA DIALOGOVOY INFORMATSIONNO-SPRAVOCHNOY PODSISTEMY 'LIMIT' NA MALOY EVM in Russian, 1976, 8 pp (manuscript deposited in UkrNIINTI 23 Jun 76 No 469)

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G361DEP (résumé)]

[Text] The paper formulates and solves the problem of operational accounting and distribution of limit funds for labor in man/machine dialog communication. Algorithms are described for the dialog and the entire subsystem.

## C. Education

USSR

### COMPUTERS IN TEACHING

Moscow UCHITEL'SKAYA GAZETA in Russian 30 Nov 76 p 4

[Interview with Doctor of Technical Sciences and Deputy Chairman of the State Committee for Science and Technology of the USSR Council of Ministers Mikhail Prokhorovich Kovalev and Corresponding Member of the USSR Academy of Pedagogical Sciences and head of the Applied Mathematics Laboratory of the Institute of the Contents and Methods of Teaching of the USSR Academy of Pedagogical Sciences Semen Isaakovich Shvartsburd, by Uchitel'skaya Gazeta correspondent]

[Excerpt] [Question] Please describe the present role of microcomputers.

[M. P. Kovalev] In this age of automation and control we cannot do without computer equipment. It is now encountered in industrial processes (the control of equipment and technology), in planning, and in scientific-research and planning-design work. The use of electronic calculators and control computers is made necessary by modern intensive technological processes, high equipment operating speeds, the control of space technology, and the enormous volume of scientific and technical information. A considerable number of scientists, engineers, technologists, and workers are already unable to

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UCHITEL'SKAYA GAZETA 30 Nov 76 p 4

perform their work efficiently without computers and various electronic devices.

[Question] It is known, Mikhail Prokhorovich, that the series production of small computers--microcalculators of different models--is now proceeding smoothly. Which of them are most widely used?

[M.P. Kovalev] Well, there are the Elektronika keyboard microcalculators. Take such models as the Elektronika BZ-02, Elektronika BZ-04, and Elektronika BZ-05. By pressing the keys you automatically perform four arithmetic operations to eight decimal places. You can also raise numbers to powers and calculate percentages.

There is another group of keyboard microcalculators--the Elektronika BZ-18, 18A, 19, and 23 models. In addition to the four arithmetic operations, they can raise numbers to any power using real exponents, find the values of reciprocals, compute logarithms and antilogarithms, and find the values of trigonometric functions, including inverse functions. All these operations are entered manually using 20 keys.

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UCHITEL'SKAYA GAZETA 30 Nov 76 p 4

[Question] All the same, microcalculators are still a rarity...

[M. P. Kovalev] Not that much of a rarity. In the next few years many of the microcalculators that we use today will be produced in even greater quantities. In the future, the cost of the component parts of microcalculators and the labor-intensiveness of their assembly should markedly decrease. This means that in the near future they will become widely utilized instruments in individual work and in everyday life.

[Question] Will microcalculators be used in teaching?

[S. I. Shvartsburd] The 25th Party Congress assigned the task of bringing existing methods and resources used in teaching into conformity with the requirements of scientific and technical progress. Therefore your question can only be answered affirmatively. However, microcalculators must not be introduced into the existing system of teaching mathematics without careful testing. This would prevent schoolchildren from mastering the calculation skills as provided by the curriculum.

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UCHITEL'SKAYA GAZETA 30 Nov 76 p 4

[Question] Nevertheless, teaching schoolchildren to use microcalculators now would most likely have the effect of preparing them for life.

[S. I. Shvartsburd] Yes, of course. Imagine for a moment that our teachers have these devices at their disposal, have mastered the methods of using them to teach calculation, and have available text-books and teaching methods aids. Then calculation tables and the slide rule could be completely dispensed with. (Incidentally, they are not catching on well in the secondary educational institutions.)

Microcalculators enable schoolchildren to calculate much faster and with greater accuracy. There could be a substantially greater amount of calculation work than at present, making it qualitatively possible to solve problems that cannot now be assigned in secondary educational institutions. What real savings in school hours would be obtained!

Students studying mathematics, physics, chemistry, and labor and special series subjects in school, the secondary vocational-technical school and the tekhnikum have a great deal of calculation work. And the nature of

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UCHITEL'SKAYA GAZETA 30 Nov 76 p 4

calculation work, as is known, requires in addition to sound knowledge, abilities, and skills, fairly close attention and great effort. Often, as a result of difficulties and mistakes in calculations, many students lose the thread of the substance of the work they are doing and consequently do not master the material. A calculator that is convenient for daily use could be of help here.

[Question] Since microcalculators are already in series production but have not yet been widely distributed, now is obviously the time for pedagogical experiments.

[S. I. Shvartsburd] Their main task is to determine the educational role of small calculators in teaching. Naturally it will be necessary to keep a close eye on positive results of the experiment while not missing a single negative factor and endeavoring not to lose a single grain of our school's experience.

During the course of the experiments, the pedagogical goals and the limits and nature of the use of microcalculators in teaching should be defined and 5/6

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UCHITEL'SKAYA GAZETA 30 Nov 76 p 4

the capabilities of the schoolchildren for working with them should be ascertained. It will be necessary to revise a number of the exercises of the mathematics program and to develop methods for teaching computing on the electronic devices. An enormous amount of scientific-research methods work must be done. Concomitant research in the area of engineering and pedagogical psychology should play a role of no small importance.

It would appear that now it is most advisable that the experiment be organized beginning with the senior grades. Then skills in calculation will not suffer and the foundation on which the teaching of computation is built will not be impaired. If the results are successful, the use of microcalculators can later be gradually "pushed back" to earlier teaching years.

Accustoming schoolchildren to microelectronic equipment is of great polytechnical importance. Moreover, the level of teaching scientific principles is raised and vocational orientation is more successful.

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## D. Artificial Intelligence

USSR

YELIGULASHVILI, E.

ARTIFICIAL INTELLIGENCE

Moscow LITERATURNAYA GAZETA in Russian No 39, 29 Sep 76 p 13

[Abstract] The discussions of artificial intelligence printed in issues 1, 17 and 27 of "Literaturnaya Gazeta" have prompted considerable reader response, including favorable comments, questions for the authors and also differences of opinion. Besides this, some readers are disappointed that many aspects of the problem of artificial intelligence have not been dealt with in these articles. However, one should bear in mind that this area is too extensive, specific and diverse to be covered entirely in a few newspaper articles. For this reason the parties to the discussion have concentrated mainly on the scientific and technical principles of developing "thinking machines" and some of the social consequences they entail. While they acknowledge the unavoidable incompleteness of examination of the subject in these newspaper articles, the authors would like at the same time to point out to the readers that many of the problems beyond the scope of this discussion are dealt with in other publications that are more specialized.

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USSR

YELIGULASHVILI, E., LITERATURNAYA GAZETA, No 39, 29 Sep 76 p 13

In this article "Literaturnaya Gazeta" correspondent Yeligulashvili discusses the reasons for development of artificial intelligence with V. Chavchanidze, Director of the Institute of Cybernetics of the Georgian Academy of Sciences.

The functional similarities of thinking machines with the human brain are emphasized in various applications where artificial intelligence is a "tool" that helps to enrich human life. It is in the area of heuristic methods that development of artificial intelligence is most needed. While most of the problems now assigned to machines in this area are of a non-creative nature, research is now in progress on the development of creative and evaluative systems.

Some of the fears involved in competition between machine and man are examined in the light of possible development of future automata in areas considered the exclusive realm of human activity. The need for some kind of "moral code" in future development of artificial intelligence is considered, and in this connection Isaac Asimov's three laws of robotics are mentioned as emphasizing noninjury to humans first, obedience second, and self-protection last. Mention is also made of James R. Slagle's warning that the "higher goal" of artificial intelligence must be the good of mankind.

2/2

USSR

UDC 007:62

BOYARCHENKOV, M. A., Doctor of Technical Sciences, ZENKIN, G. M., Candidate of Biological Sciences, MAZO, B. L., Candidate of Technical Sciences, and PETROV, A. P., Candidate of Physico-Mathematical Sciences

EXPERIMENTS ON TRAINING A SYSTEM OF ADAPTIVE SELF-TEACHING CLASSIFIERS TO RECOGNIZE HANDWRITTEN CHARACTERS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 7, 1976 pp 4-7

[Abstract] A study is made of an adaptive self-teaching classifier system which includes a physical model of the classifier consisting of magnetic adaptive elements and a general-purpose computer. Results are presented concerning an experiment in which it is attempted to reach this system to recognize handwritten characters in the Russian alphabet, plus Arabic numerals and simple mathematical symbols (+, -, =). A structural diagram of the system is presented, including a BESM-4 computer, interface, printer, synchronization and communication device. Samples of the characters which the machine was asked to recognize are presented. The algorithm of the operation of the recognition system is briefly described. A flow chart of the program involved in the learning process is presented. The experiments demonstrated that an attempt to produce a Gestalt operator unit in the form of an analogue device using adaptive elements can be quite successful. The  
1/2

USSR

BOYARCHENKOV, M. A., ZENKIN, G. M., MAZO, B. L., and PETROV, A. P., PRIBORY I SISTEMY UPRAVLENIYA No 7, 1976 pp 4-7

development of effective methods to analyze images using optical methods allows a great increase in the operating speed of systems, making them applicable for practical uses.

IV. NATURAL SCIENCE RESEARCH  
A. Biology and Medicine

USSR

POLOVINKIN, A., doctor of technical sciences and professor, head of the Laboratory of Mathematical Methods of Optimal Design, Mariyskiy Polytechnic Institute

COMPUTER SEARCHING FOR NEW TECHNICAL SOLUTIONS

Moscow NAUKA I ZHIZN' in Russian No 10, 1976 pp 54-61

[Abstract] With the development of technology the method of trial and error became inadequate and it became necessary and possible to seek new solutions by examining all possible variants and combinations of variants with the computer. Especially promising is the creation of new machine methods intended for use by modern computers. At the Mariyskiy Polytechnic Institute a method has been developed for the synthesis of rational forms which models the evolution of living organisms. The essence of the method consists in feeding into the computer storage the initial forms -- prototypes, programs for their change and programs for estimating the effectiveness ("viability") of any form. The process of evolution takes place in the computer. A starting form is selected and varied in a definite manner (randomly or determinedly). In nature, such changes are called mutations. Then the effectiveness of the new form is estimated or calculated and it is compared with the prototype.

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USSR

POLOVINKIN, A., NAUKA I ZHIZN' No 10, 1976 pp 54-61

If the new form proves to be better, it becomes the prototype for further evolution. If not, the new form is destroyed and the previous prototype again undergoes change. Here the computer simulates the work of a designer. At present only the first steps have been made in automating the synthesis of new technical solutions and the theoretical and experimental results are still very scanty. However, those results and the prospects of development of computer technology known for the very near future make it possible to predict that in 25 years most problems of technical creativity will be solved by computer. This will considerably intensify the capacity of men and make his creative activity still more effective.

2/2



USSR

SHTAN'KO, A., chief of the Department of Computer Technology and Control Systems of the Ministry of the Medical Industry

#### AUTOMATED MANAGEMENT SYSTEM FOR THE MEDICAL INDUSTRY

Moscow MEDITSINSKAYA GAZETA in Russian ("ASU -- a Reliable Helper") 17 Sep 76  
p 1

[Abstract] An automated branch-of-industry management system, called ASUmedprom, has been put into operation in the Ministry of the Medical Industry. Consisting of eight subsystems and three automated enterprised management systems, it has ushered in a high level of computerized calculations in the day-to-day work of the ministry and has proven especially effective in operative control of production at the Leningrad Industrial Association "Krasnogvardeyets" [Red Guard] and the Izyum Optical-Mechanical Plant.

ASUmedprom differs from the computerized management systems of other industrial ministries in that the criterion of its effectiveness is the extent to which clients' orders for the industry's products are fulfilled. This approach was dictated by the desire to have the system yield the greatest economic effect. At the same time, it is necessary that ASUmedprom be compatible with the  
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USSR

SHTAN'KO, A., MEDITSINSKAYA GAZETA 17 Sep 76 p 1

computerized systems of other ministries, especially with the ASU "Zdravookhraneniye" [Automated Management System "Public Health"]. Hence, it is now necessary to begin to accelerate work on unification and standardization of documentation, mutual correlation of information flows, etc.

The three enterprise automated management systems that are already in operation have all been established at medical equipment plants, automation of which entails fewer difficulties than automation of chemical-pharmaceutical enterprises with their small volumes and frequent replacement of nomenclature. Despite the complexity of the problem, however, the first ASU for a chemical-pharmaceutical enterprise is now being developed for the Belgorod Vitamin Combine.

During the 10th five-year plan, ASU's will be developed for five more enterprises and for two technological processes. During the 10th five-year plan it is also intended to increase the level of automation of technological processes for basic types of production, improve the quality and increase the output of medical products, improve management, and stabilize the numerical strength of the management apparatus.

2/2

USSR

KANEP, V., Minister of Public Health Latvian SSR, corresponding member of the Academy of Medical Sciences USSR

#### PROGRESS OF COMPUTERIZED MEDICINE IN LATVIYA

Moscow IZVESTIYA in Russian ("Electronics--the Physician's Helper") 2 Nov 76  
p 5

[Abstract] This article is a review of progress on implementation of computers in public health in the Latvian SSR. The author reports that the first stage of a computerized inventory system for the republic's pharmaceutical industry is already in service. It was developed by the Information-Computer Center of the Ministry of Public Health Latvian SSR in cooperation with the Institute of Electronics and Computer Technology of the Academy of Sciences Latvian SSR.

As regards computer-assisted systems for prophylactic examination and diagnosis, their hardware is still only in the experimental stage. Series production of such hardware is one of the pressing problems of the moment. One of the component parts of an automated prophylactic complex is a so-called auto-interviewer, which consists of a specially programmed mini-computer connected to a video screen. Latvian medical scientists working with their colleagues at the USSR Academy of Medical Science's Scientific  
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USSR

KANEP, V., IZVESTIYA 2 Nov 76 p 5

Research Institute of Rheumatism. After the examinee answers all the questions which appear on the screen by pushing the "yes" or "no" buttons, the minicomputer "writes" a preliminary diagnosis on the screen. In the course of examination of 900 patients, the auto-interviewer's conclusions coincided with those of physicians nearly 90 percent of the time, and not a single ill person "slipped through" the system. A more accurate version of the auto-interviewer has been created by Latvian scientists plus specialists from the All-Union Scientific Research Institute of Medical Instrument Building; this system takes into account the results of electro- and phonocardiograms.

Another achievement of Latvian public health is the "TASI-KADR" system for computer-assisted processing of data from analysis of cells. It was developed jointly by engineers and by associates of the Institute of Electronics and Computer Technology of the Academy of Sciences Latvian SSR.

2/2

USSR

RYABTSEV, V., professor, deputy rector of the First Moscow Medical Institute  
imeni I. M. Sechenov

#### AUTOMATED SYSTEM FOR MEDICAL EXAMINATIONS

Moscow IZVESTIYA in Russian ("The Computer and the Physician--Colleagues")  
23 Sep 76 p 5

[Excerpts] In order to provide large-scale dispensary service to the entire population we must set up an automated system for mass preventive examination of the population (ASPON).

The First Moscow Medical Institute has been assigned to work out the methodology of such examinations using automated systems. The technical side of the work, creating the automatic instruments for examination of patients, coordinating them into a single system, standardizing them, and tying them into a computer, has been assigned to the All-Union Scientific Research Institute of Medical Instrument Making of the USSR Ministry of the Medical Industry.

How is work going on the ASPON? Workers at the First Moscow Medical Institute have worked out the examination methodology and its logical relationships and have used it (although not yet with a full set of instruments) to examine a  
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USSR

RYABTSEV, V., IZVESTIYA 23 Sep 76 p 5

large group of college students. The data were processed by computer. The examinations were significantly more efficient and exact than with traditional methods.

We should mention that specialists at the All-Union Scientific Research Institute of Medical Instrument Making have built a series of instruments necessary for the automated system and submitted test models. But the tests showed that the instruments are not ready for use yet. Many of them give inaccurate readings. There is no interrelationship in the work of the instruments and data input to the computer has not been worked out at all. Automatic instruments to test arterial pressure, acuteness of hearing, to take electrocardiograms, and others have not been built yet.

The task of rapidly building automatic systems for large-scale preventive examinations is a very urgent one. It is now clear that the All-Union Scientific Research of Medical Instrument Making cannot handle it alone. It would seem wise to enlist the efforts of enterprises and the USSR ministries of the electronics industry, the radio industry, communications  
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USSR

RYABTSEV, V., IZVESTIYA 23 Sep 76 p 5

equipment, and numerous others who already have experience in making such instruments. It is also necessary to establish a coordinating council to direct and combine the efforts of different departments.

We must have series production of automatic systems for preventive examinations. Only in such a case will the ASPON, whose principles are already fully worked out, help medical workers to perform the enormous job given to the Soviet public health system.

3/3

USSR

GALUSHKIN, A., Doctor of Medical Sciences, head of a laboratory of the Institute of Medical Technology of the Ministry of Public Health USSR

#### COMPUTERS USED IN MEDICAL DIAGNOSTICS

Moscow VECHERNYAYA MOSKOVA in Russian ("The Electronic Assistant of the Physician") 10 Jul 76 p 2

[Abstract] Galushkin discusses the use of computers in his laboratory to assist in medical diagnosis and information processing. A system which records sounds in the heart for diagnosis of cardiovascular diseases was developed in cooperation with the Institute of Cardiology imeni Myanikov, the Moscow Oblast Clinical Institute imeni Vladimirskiy, and the All-Union Scientific Research Institute of Clinical and Experimental Surgery. Several hundred heart sounds are recorded and analyzed, and the data is stored in a computer's memory. Subsequently, the computer can make a diagnosis of patients' heart problems by comparing their heart sounds with those in its memory bank. Another system for diagnosing liver ailments has undergone clinical tests in the department for transplantation of organs and tissues of the Second Moscow Medical Institute and has shown promising results.

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USSR

GALUSHKIN, A., VECHERNAYA MOSKVA 10 Jul 76 p 2

A computerized apparatus at the Institute of Cardiology imeni Myasnikov is used to conduct and process psychological tests of patients to aid heart specialists in determining the causes of cardiovascular diseases. A complex for taking mass cardiovascular examinations of the population is established at Galushkin's institute, and will soon begin serving residents of one of the regions of Moscow. In using this complex, the patient will first answer a set of questions on a machine according to a computer program. Data on height and weight and an electrocardiogram and blood analysis are taken automatically. After this the patient pedals an ergometer bicycle while the computer monitors his body systems, compares the data with its memory bank, and notes any irregularities.

2/2

USSR

SPEKTOR, M., special correspondent of Meditsinskaya Gazeta, Baku

THREE-COMPUTER SYSTEMS ESTABLISHED IN BAKU HOSPITAL

Moscow MEDITSINSKAYA GAZETA in Russian ("The Center Has Been Put Into Operation") 25 Aug 76 p 3

[Abstract] The article reports on the use of three parallel computerized patient-monitoring systems in the Reanimation Section of the Baku Republic Clinical Hospital. The three systems are linked with the Republic Information-Computer Center of the Azerbaydzhan Ministry of Public Health. The first system is called "surgical room--computer." Instrument data on the patient's condition (pulse, temperature, etc.) are transmitted to a monitoring station next to the surgical room. A physician at a control panel records the data and transfers it by means of a special device to an indicator board in the surgical room for viewing by the surgeons and reanimologists. All the information on the patient is fed to a Minsk-32 computer and the physician at the control panel can receive a detailed prognosis at the monitoring station.

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USSR

SPEKTOR, M., MEDITSINSKAYA GAZETA 25 Aug 76 p 3

The second system is called "ward--computer." A number of intensive therapy beds for different medical problems--cardiology, gastroenterology, neurosurgery, etc.,--are each provided with apparatus which transmit information about a patient to a monitoring station which in turn relays the data to a computer. If the computer receives information that a patient's condition is worsening, it automatically transfers its full attention to that patient and begins to send out an uninterrupted flow of information about the patient.

The third system is called "special ambulance--computer." The reanimation section has a special ambulance equipped with devices which can transmit an electrocardiogram by telephone. Once the patient is placed into the ambulance, information about his condition is transmitted to a computer and a prognosis can be sent at a distance to the doctors.

The basic technical development of these systems was done by associates of the Leningrad Special Design Bureau of Biological and Medical Cybernetics "Biokibernetika" under the direction of Professor V. Akhutin, laureate of the Lenin Prize. Others who assisted in the implementation were G. Dubrovich, head of the Reanimation-Anesthesiology Section of the hospital, and associates of the Republic Information-Computer.

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USSR

SPEKTOR, M., MEDITSINSKAYA GAZETA 25 Aug 76 p 3

At the present time, work is proceeding on a program for continuous observation of a patient in which the computer will switch the monitor upon signal to a system of continuous data registration.

USSR

UDC 616.12-073.97-056.78:681.3

PUPKO, I. D., KEYVER, A. R., and GRIGOR'YEV, N. N.

THE EAK-2 COMPUTER DEVICE FOR AUTOMATION OF MASS ELECTROCARDIOGRAPHIC EXAMINATIONS

Moscow MEDITSINSKAYA TEKHNIKA in Russian No 5, Sep-Oct 76 pp 12-16

[Abstract] This article describes the workings of the EAK-2 express cardiogram analyzer for automatic real-time analysis of electrocardiosignals. It is designed for conducting mass electrocardiographic examinations and detecting those persons whose EKG's have deviations from the normal. At the beginning of 1976, more than 270 models of the EAK-2 had been produced and installed in the public health stations of enterprises, sanatoriums, physical culture dispensaries, and medical treatment institutions.

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USSR

GOTAIB, M., physicist

THE UNION OF MEDICINE AND CYBERNETICS

Baku BAKINSKIY RABOCHIY in Russian 9 Oct 76 p 4

[Abstract] A brief discussion is presented of some of the new ways that computer technology is being put to work in diagnosis and treatment of severe illness, notably in reanimation and anesthesiology. Continuous monitoring systems keep track of five physiological parameters simultaneously and compare them with three thousand histories of the given illness stored in the computer memory. In addition, this comparison takes into consideration such data as the age of the patient, the mechanism of the trauma, general state of health, laboratory analysis and other features. The most serious work is now being done in connection with reanimation, where the entire organism is on the verge of death. A program is being developed to diagnose the condition of the entire medical-biological system of the patient, treating the various organs in their mutual relations rather than separately. The greatest difficulty is in the area of nonspecific changes, which has not been adequately studied in medicine.

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## B. Physico-Chemical and Earth Sciences

USSR

### THE COMPUTER IN A NUCLEAR EXPERIMENT

Leningrad LENINGRADSKAYA PRAVDA in Russian 22 Aug 76 p 1

[Excerpt] The problem of automation of scientific research is one of the main trends in the activity of the staff of the Leningrad Institute of Nuclear Physics imeni B. P. Konstantinov, Academy of Sciences USSR. The institute met the new five-year plan with great achievements in the creation of an automated computer-measuring complex.

This complex is a multi-level system based on general-purpose electronic computers and specialized devices. It includes a computer center with a BESM-6 which is connected via communication lines with the collective-use laboratory information-measuring centers. In turn, 40 terminal stations, which service various experiments, are connected to these centers. The make-up of the terminal stations includes minicomputers(s), industrial instruments, specialized electronic devices, teletypes, and displays. The operation of the network is organized by a Minsk-32 computer, which controls the transmission of information from the laboratory centers to the BESM-6 and vice versa. At the present time, more than 500 of the institute's scientific associates are actively utilizing electronic computer technology in their scientific research.

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USSR

LENINGRADSKAYA PRAVDA 22 Aug 76 p 1

The developers of this multi-machine network--S. N. Nikolayev, A. S. Denisov, V. I. Kadashevich, I. A. Kondurov, L. P. Soldatov, I. I. Tkach, and V. A. Shchegel'skiy--have also developed a program for the introduction of computer technology, which will ensure further enhancement of the effectiveness and quality of scientific research during the 10th five-year plan.

In the photographs [not reproduced]: the experimental hall of the synchrocyclotron; in the main computer center of the institute senior engineer N. D. Raytsepa and radio mechanic A. Volnukhin are debugging a new unit for the computer.

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GORBUNOV, A. N., ZUBOVA, YE. A., KUTSENKO, A. V., KUCHUMOVA, M. S., STUPIN, YU. V., FUTO, A. and KHAYDU, K.

THE HYDRA MODULAR SOFTWARE SYSTEM FOR YeS COMPUTERS AND THE M-4030 COMPUTER

Moscow SISTEMA MODUL'NOGO PROGRAMMNOGO OBESPECHENIYA GIDRA DLYA YeS EVM I EVM M-4030 in Russian, Physics Institute of the Academy of Sciences USSR. High Energy Physics and Cosmic Ray Physics, Preprint No 55, 1976, 4 pp, mimeo.

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G422 by Ye. F. Fabrikantova]

[Text] The paper discusses the results of adaptation of the HYDRA system of programs for experimental data processing constructed in accordance with a modular principle. The HYDRA system can be used for solving problems in experimental physics (processing data obtained in bubble and spark chambers), chemistry (investigation of multiple-bond chemical compounds), and also for developing multinet network power systems. The HYDRA system enables one to compile a system from individual modules that is ready for operation for almost any computer. The system considerably extends the capabilities of FORTRAN algorithmic language, permits operation with a dynamically distributed

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USSR

GORBUNOV, A. N., ZUBOVA, YE. A. et al., SISTEMA MODUL'NOGO PROGRAMMNOGO OBESPECHENIYA GIDRA DLYA YeS EVM I EVM M-4030, Physics Institute of the Academy of Sciences USSR. High Energy Physics and Cosmic Ray Physics, Preprint No 55, 1976, 4 pp, mimeo.

memory, allows processing of large volumes of experimental data, organization of connections between separate modules via special systems programs, etc. In operation, the complete system uses 192K of the main computer memory. At the Physics Institute of the Academy of Sciences USSR the system has been adapted for a base set of computers of the YeS 1020 type including a main memory with volume of 64K, a magnetic disk store and magnetic tape stores. For installing the system on YeS4030 computers, the initial tape with the HYDRA system for YeS computers can be used, or a punchcard variant. References 7.

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USSR

UDC 681.3.06

GOVORUN, N. N., and IVANCHENKO, Z. M.

SOFTWARE FOR A TIME-SHARING SYSTEM FOR PROCESSING OF PICTURES FROM TRACK CHAMBERS

Moscow PROGRAMMIROVANIYE in Russian No 4, 1976 pp 52-65

[Abstract] This article studies the software (its purpose, structure and primary properties: multiprogramming, interaction, modular principal and operational dynamics) of a system created at JINR [Joint Institute for Nuclear Research] for processing of chamber pictures, based on semi-automatic measurement devices such as the PUOS and SAMET and a modernized BESM-4 computer. Primary attention is given to the overall organization of control of the computational process of the chamber and the process of measurement with simultaneous operation of up to 21 measuring devices in real time. 17 references.

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USSR

Photo Caption

Vil'nyus SOVETSKAYA LITVA in Russian 10 Oct 76 p 2

[Summary] A photo [not reproduced] in a recent issue of Sovetskaya Litva shows engineer V. Veytas, group chief at the Institute of Physics and Mathematics of the Academy of Sciences Lithuanian SSR, standing by the institute's newly installed BESM-6 computer.

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USSR

UDC 629.7.05

ANDRIENKO, A. YA., IVANOV, V. P., PETROV, B. N., PORTNOV-SOKOLOV, YU. P.  
(Moscow)

PROBLEMS AND METHODS OF THE THEORY OF ON-BOARD TERMINAL CONTROL SYSTEMS

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 7, 1976 pp 36-51 manuscript  
received 11 Dec 75

[Abstract] Terminal control systems are those designed to bring the object controlled to a desired state at an assigned moment in time or an assigned point in space. Terminal systems are most widely used in rocket and space technology. The specific nature of the tasks and operating conditions of control systems on mobile objects makes it desirable to study on-board terminal systems as an individual class. Examples are given, such as soft landing systems and rendezvous and docking systems, requiring high accuracy of the terminal state of the vehicle. Terminal systems are multipurpose systems, designed to produce different terminal states during different flight stages or even during different flights as in the case of a space shuttle. A general statement is presented of the problem of synthesis of on-board terminal control

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USSR

ANDRIENKO, A. YA., IVANOV, V. P., PETROV, B. N., PORTNOV-SOKOLOV,  
YU. P., AVTOMATIKA I TELEMEXHANIKA No. 7, 1976 pp 36-51

systems, as well as the physical principles of solution of the problem. The synthesis of terminal impulse control systems is analyzed considering system-structure limitations. Limitations include main memory capacity of the control device, long-term memory capacity and the number of types of operations which can be produced by the control device. The limiting accuracy characteristics of terminal control systems are estimated. A discussion is presented of the problem of prediction encountered in the synthesis of terminal control systems where the description of the object of control is uncertain. Statistical optimization of programs for changing the intervals of quantization of impulse terminal systems is discussed, as is the principle of discrete threshold programmed control. The methods presented do not represent the entire apparatus of the theory of on-board terminal control systems, but these methods in combination with other results of the theory, allow many applied problems of the planning of on-board terminal control systems to be solved.

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ZUYEV, V. I. and YAZYKIN, I. M., compilers

MEMORY DEVICES FOR AIRBORNE COMPUTERS. SURVEY OF NON-SOVIET SOURCES

Moscow ZAPOMINAYUSHCHIYE USTROYSTVA BORTOVYKH VYCHISLITEL'NYKH MASHIN. OBZOR PO ZARUBEZHNYM ISTOCHNIKAM in Russian, All-Union Scientific Research Institute of Interbranch Information, 1976, 72 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G480K by V. K. Pryanikova]

[Text] Appreciable improvement in the technical and operational characteristics of airborne digital computers depends to a great extent on advances in the area of development of data storage facilities. A number of additional conditions imposed on airborne equipment make it necessary for developers to be knowledgeable not only in principles of storage and the parameters of memory devices, but also to be acquainted with new developments in memories, their characteristics and capabilities. A description is presented of the memories most widely used in existing equipment or in the concluding stage of long-range experimental development.

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V. INFORMATION SCIENCE  
A. Information Services

USSR

UDC 681.3:51.007

RUKHADZE, V. A., engineer, BAYKOVSKIY, V. M., Candidate of Technical Sciences

THE "REFERAT" BRANCH AUTOMATED SCIENTIFIC AND TECHNICAL INFORMATION SYSTEM  
FOR INSTRUMENT BUILDING

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 1, 1976 pp 10-13

[Abstract] An automated scientific and technical information system called "Referat" has been developed; it is intended to increase significantly the completeness and timeliness of reference information servicing of specialists in the instrument building branch of industry. The first stage of "Referat" has been in operation since 1971. "Referat" provides for the collection, analytic processing, storage with various degrees of reduction, retrieval, output and transmission over long distances of scientific and technical information on instrument building, automation equipment and control systems. It is an effective tool for decision making in the sphere of management, development of scientific and technical predictions, research and investigation, scientometric studies and multilevel information servicing of specialists in this branch of industry. In the process of creation of the system, a descriptor-type retrieval language was developed for formalized description of information to be put into the system and several new devices

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USSR

RUKHADZE, V. A., BAYKOVSKIY, V. M., PRIBORY I SISTEMY UPRAVLENIYA No 1,  
1976 pp 10-13

were developed for processing, storage, automated retrieval and copying of text information. "Referat" is a system of organizational equipment, electronic data processing and effective methods of organization of information processes. It is based on the integral principle of construction: various information services are provided by one-time processing of the initial information. Four types of information service are provided, with documentary information stored and retrieved individually for documents, their abstracts and retrieval titles: selective distribution of newly arriving information; responses to requests of subscribers; preparation of files in various areas of instrument building; and preparation of branch abstract collections. A schematic diagram of the system is presented.

USSR

IVANOV, G., correspondent of Pravda

#### INFORMATION SYSTEM DEVELOPED FOR MACHINE BUILDING PLANTS

Moscow PRAVDA in Russian ("Electronics Remembers") 11 Nov 76 p 2

[Summary] A group of engineers at the Scientific Research and Design Institute of Automated Control Systems in Volgograd has developed a multi-channel information system, the first version of which has been manufactured for the Khar'kov Plant of Tractor Motors.

The new system collects data from work places and transmits it to memory devices at a central dispatcher point. From here, all the necessary information is sent over a telephone cable to the enterprise's "command posts."

It is planned to install similar multi-channel information systems at 100 machine building plants by the end of the current five-year plan.

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USSR

UDC 681.3.015

BUDZINAUSKENE, YE. T., and PETERSON, E. YA.

#### SELECTION OF AN EFFICIENT STRUCTURE FOR MATCHING OF REMOTE USERS WITH A COMPUTER IN AN INFORMATION-COMPUTER NETWORK

Riga AVTOMATIKA I VYCHISLITEL'NAYA TEKNIKA in Russian No 5, 1976 pp 48-51

[Text] The task of selecting an efficient method of matching remote subscribers with a computer in an information-computer network is performed. Three types of matching devices are analyzed, differing in their distribution of the exchange functions in the system. Graphs are presented allowing determination of efficient ranges for utilization of existing versions of matching devices for connection of remote users to computers. 1 Figure; 3 References.

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USSR

UDC 681.3.106

PALAMARCHUK, S. I., and BOL'BOTENKO, T. G., engineers

ONE APPROACH TO THE ORGANIZATION OF MULTIACCESS

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No 4, Jul-Aug 76  
pp 59-61

[Abstract] The principles of organization of collective access, executed in a multiaccess module for the "Minsk-32" computer are presented. The principles are used in an information retrieval system.

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USSR

UDC 518.74

KAGAN, B. M., CHERNOV, V. G. and CHURSIN, V. N.

ANALYSIS OF THE EFFECTIVENESS OF USING DATA BASES IN PACKAGE PROCESSING SYSTEMS

Moscow OBRABOTKA DANNYKH NA EVM TRET'YEGO POKOLENIYA [Data Processing on Third-Generation Computers, Collection of Works] in Russian 1976 pp 94-98

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V759]

[Text] In construction of data banks for operation in the package mode, considerable importance attaches to selection of rational organization of data on the medium. The criterion for distinguishing the physical organization of data is the method of realization of connections between segments in the data base. In accordance with this criterion two principal methods of data organization can be distinguished: organization of logical recordings in the form of a physically ordered sequence of segments on the carrier; organization of logic recordings with the aid of associative relations between segments.

The purpose of this work is to compare these two methods of data organization under package processing conditions. Comparison of these methods

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USSR

KAGAN, B. M., CHERNOV, V. G. and CHURSIN, V. N., OBRABOTKA DANNYKH NA EVM TRET'YEGO POKOLENIYA, 1976 pp 94-98

is based on an examination of a data base comprised of logical recordings of a tree-like structure. Each recording has a head segment and a hierarchy of subordinates. The key to the head segment is the recording identifier.

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VI. THEORETICAL FOUNDATIONS  
A. Game Theory and Operations Research

USSR

UDC 62-52:007.5

MIKADZE, I. S.

ON THE PROBLEM OF DETERMINING THE PRODUCTIVITY OF A COMPUTER THAT IS PART OF  
A DATA PROCESSING SYSTEM

Moscow SOOBASHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 81, No 3,  
1976 pp 673-676

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G387 by  
V. K. Pryanikova]

[Text] On the basis of queueing theory an investigation is made of questions  
of determining the productive capacity of a computer working in a system for  
sequential processing of data where the incoming stream of demands is dis-  
tributed in accordance with the Poisson law, and the computer is subject to  
two kinds of failures. In case of the first type of failure the demand must  
be completely resatisfied, while in case of the second type only recalculation  
of the distorted part of a demand is required. Streams of failures are also  
distributed by the Poisson law with intensities  $\alpha$  and  $\beta$ . To reduce the  
average time of satisfying demands and improve a number of characteristics  
of the system, the program for satisfying demands is broken down into a  
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USSR

MIKADZE, I. S., SOOBASHCHENIYA AKADEMII NAUK GRUZINSKOY SSR Vol 81, No 3,  
1976 pp 673-676

certain number of independent stages for which the time of satisfaction in  
the general case is differently distributed in accordance with an arbitrary  
law of random qualities.

ZHURBENKO, NIKOLAY GEORGIYEVICH, junior scientific associate of the Institute of Cybernetics of the Academy of Sciences Ukrainian SSR, Kiev; PINAYEV, YEVGENIYA GEORGIYEVICH, Candidate of Technical Sciences, chief of a department of the State Scientific Research Institute of Civil Aviation, Moscow; SHOR, NAUM ZUSELEVICH, Doctor of Physico-Mathematical Sciences, senior scientific associate of the Institute of Cybernetics of the Academy of Sciences Ukrainian SSR, Kiev; and YUN, GENNADIY NIKOLAYEVICH, Candidate of Technical Sciences, senior scientific associate of the Institute of Cybernetics of the Academy of Sciences Ukrainian SSR, Kiev

SELECTION OF FLEET COMPOSITION AND DISTRIBUTION OF CIVIL AIRCRAFT AMONG AIRLINES

Kiev KIBERNETIKA in Russian No 4, Jul-Aug 76 pp 138-141

[Abstract] Algorithms are suggested for the solution of large-dimension linear programming problems which arise in the selection of an optimum composition of an aircraft fleet and in distribution of the aircraft among airlines. The algorithms were implemented on the BESM-6 computer using the ALGOL-60 programming language. References 4: 3 Soviet, 1 Western.  
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USSR

UDC 681.325:621.378

KOSTSOV, E. G., MALINOVSKIY, V. K., NESTERIKHIN, YU. YE., and POTAPOV, A. N.

DISTINCTIVE FEATURES OF PHYSICAL EXECUTION OF A MAIN OPTICAL MEMORY

Novosibirsk AVTOMETRIYA in Russian No 4, 1976 pp 3-6

[Abstract] Distinctive features of elements of a main optical memory are examined, a physical model of the cell of a main optical memory is proposed and physical effects used in constructing optical memory systems are discussed. It is shown that from the point of view of the possibility of physical execution of an optical system, the photoelectric conversion of energy during recording and the electrooptical effect during readout have been made the working basis. This work was reported at the First Soviet-American Symposium on Optical Data Processing, Washington, 1975. References 5; Illustrations 2.

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USSR

UDC 518.74

SEMKIN, V. A. and SHUVIKOV, V. I., editorial staff of "Avtomatika i Vychislitel'naya Tekhnika," Academy of Sciences Latvian SSR

DETERMINATION OF THE NUMBER OF INTERLEVEL EXCHANGES IN HIERARCHICAL MEMORIES FOR REALIZATION OF ONE CLASS OF ASSIGNMENTS

Riga OPREDELENIYE CHISLA MEZHUROVNEVYKH OBMENOV V IYERARKHICHESKIKH ZU PRI REALIZATSII ZADACH ODNOGO KLASSA in Russian, 1976, 18 pp (manuscript deposited in VINITI 20 Apr 76 No 1365-76 Dep.)

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V785DEP by the authors]

[Text] The paper deals with determining the number of interlevel exchanges in multilevel storage units when solving problems that have a well-defined stationarity of statistical characteristics of the process of information access (for instance problems in automated control systems).

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USSR

ZAKHAROV, V. N.

SOME RESULTS OF STATISTICAL STUDIES OF AN OPERATING SYSTEM AND THE  
UTILIZATION OF THESE RESULTS

Moscow PROGRAMIROVANIYE in Russian No 4, 1976 pp 73-77

[Abstract] This article discusses certain problems of increasing the effectiveness of modeling programs for machines with similar architecture. A method is described for creation of a program which collects information concerning privileged operations performed in the operating system. Results are presented from investigation of the system from this standpoint. Methods are indicated for using the data produced to increase the effectiveness of utilization of the operational system. 3 References.

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USSR

UDC 518.74

BERULAVA, R. G., VARAZI, G. L., DZHANDZHGA, L. M., DIDISHVILI, Z. I., KEL-  
BAKIANI, D. F., LEZHAVA, D. D., MAKHARADZE, V. SH., PERADZE, R. K., SVANIDZE,  
N. V., UKLEBA, D. D., TSINADZE, N. N., CHUMBURIDZE, L. G. and CHKHANDZE, O. SH.

DIRECT COUPLING BETWEEN BESM-6 AND BESM-4 COMPUTERS

Tbilisi ISSLEDOVANIYE NEKOTORYKH VOPROSOV VYCHISLITEL'NOY TEKHNIKI I ELEKTRO-  
TEKHNIKI [Investigation of Some Problems of Computer Technology and Electrical  
Engineering, Collection of Works] in Russian No 2, 1976 pp 5-25

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V714]

[Text] The paper gives the principle of logic-circuit coupling of the  
BESM-6 and BESM-4 computers and shows the finished electronic coupling  
devices. A flowchart is given for the program that transfers data from the  
BESM-4 to the BESM-6 based on the principle of unilateral information coupling  
in the presence of a controlling feedback signal from the BESM-6 base machine  
to the BESM-4.

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USSR

UDC 681.39

KOVAL', V. K., SHLEZINGER, M. I. (Kiev)

TWO-DIMENSIONAL PROGRAMMING IN PROBLEMS OF IMAGE ANALYSIS

Moscow AVTOMATIKA I TELEMEXHANIKA in Russian No 8, 1976 pp 149-168  
manuscript received 27 Jan 76

[Abstract] The recognition of visual signals is a unique component part of the general problem of pattern recognition. The uniqueness of visual analysis consists in that the presence of information concerning sets of signals corresponding to classes does not lead immediately to the solution of the problem, but rather represents only the beginning of the search process, which is not always successful. A simple example is studied of a recognition problem, the precise solution to which is not yet known, in spite of the fact that the classes of recognizable signals in the problem are fully and unambiguously defined. An algorithm is described and investigated which can be used for analysis of visual patterns in this problem. The algorithm is based on the use of specific grammars which generate images, not sequences, and which are called two-dimensional grammars. The basic concepts of two-dimensional grammars and two-dimensional programming are presented. An experimental

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KOVAL', V. K., SHLEZINGER, M. I., AVTOMATIKA I TELEMEXHANIKA No. 8, 1976 pp 149-168

investigation of the algorithm is described. The number of iterations of the algorithm depends on the probability  $p$ , grammar  $G$ , number of thresholds  $p_1$  and  $p_2$ : if  $p=0$ , the mean number of iterations  $I=1$ ; if  $p=0.05$ ,  $I=15$ ; if  $p=0.1$ ,  $I=40$ . An example is presented in an appendix.

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USSR

UDC 62-50:007:621.3

BEDNARCHUK, V. N., All-Union Scientific Research Institute of Electrical Measuring Instruments

AN ALGORITHM FOR RECORDING AND PROCESSING SPARSE MATRICES IN DIGITAL COMPUTER ANALYSIS OF ELECTRONIC CIRCUITS

Leningrad ALGORITM ZAPISI I OBRABOTKI RAZREZHENNYKH MATRITS PRI ANALIZE ELEKTRONNYKH SKHEM NA ETsVM in Russian 1976 13 pp (manuscript deposited in TsNIITEIpriborostroyeniya [Central Scientific Research Institute of Information and Technical-Economic Research on Instrument Building] 21 Mar 76 No 523

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G447DEP by the author]

[Text] It is noted that the mathematical model of an electronic circuit can be found by performing certain matrix operations with topological and component matrices. The author shows the feasibility of storage and implementation of these operations on topological matrices in compact form without recording the zero elements. Algorithms are proposed for recording and processing sparse matrices in compact form. Estimates are made of the gain in volume of utilized computer memory and speed of execution matrix operations in comparison with the usual recording of topological matrices.  
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USSR

UDC 518.74

KUTSACHENKO, L. I., LAVRASHCHEVA, YE. M., PRIKHOD'KO, M. YU. and YAFFEE, V. A.

A TRANSLATOR FROM THE ARITHMETIC SUBSET OF 'ANALITIK' LANGUAGE FOR THE BESM-6 COMPUTER

Kiev VOPROSY SOZDANIYA RAS I GOSUDARSTVENNOY SETI VYCHISLITEL'NYKH TSENTROV [Problems of Establishing the RAS [Republic Automated System] and a State Network of Computing Centers, Collection of Works] in Russian 1975 pp 30-35

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V768]

[Text] The purpose of developing the translator is to do calculations on the BESM-6 by programs debugged on MIR-2 machines and coming into the BESM-6 over a communications channel.

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USSR

UDC 007:681.3.06

PEREVOZCHIKOVA, OL'GA LEONIDOVNA, junior scientific associate of the Institute of Cybernetics of the Academy of Sciences Ukrainian SSR, Kiev; SHEVCHENKO, VALERIYA VIKTOROVNA, Candidate of Physico-Mathematical Sciences, senior scientific associate of the Computer Center of Khar'kov State University

ON SYNTACTIC ANALYSIS AND LOCALIZATION OF ERRORS

Kiev KIBERNETIKA in Russian No 4, Jul/Aug 76 pp 26-34

[Abstract] One method of syntactic language analysis is studied which can be conveniently used in systems oriented towards dialog debugging of programs as well as in traditional non-dialog programming systems operating in the pure batch processing mode. References 18: 14 Russian, 4 Western.

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VII. GENERAL INFORMATION  
A. Conferences

USSR

CONFERENCE ON COMPUTERS IN SWITCHING TECHNOLOGY

Yerevan KOMMUNIST in Russian ("The Computer and the Telephone") 24 Sep 76  
p 4

[Abstract] An all-union scientific-technical symposium "The Application of Computers to Switching Technology" was held recently in Yerevan to discuss the results of Soviet work in this area. About 250 specialists from Moscow, Leningrad, Kiev, Riga, Krasnoyarsk, Novosibirsk, Tashkent, and Penza participated.

Professor O. Ivanova, Doctor of Technical Sciences and director of the Chair of Automatic Electronic Communications of the Moscow Electrical Engineering Institute of Communications, told the following to an Armenpress correspondent:

"Electronic computers for these purposes occupy an important place in scientific developments going on in our country and abroad. At the present time we are creating new quasi-electronic communications systems. And specialized computers are being earmarked for them. These systems will replace older electro-mechanical ones, over which they have important  
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KOMMUNIST 24 Sep 76 p 4

advantages. With their help subscribers will receive additional kinds of service. If you are unexpectedly invited somewhere and you are expecting an important call, all you will have to do is dial the proper code on your home telephone and you can rest easy. The call will be "re-addressed" to wherever you are. If you must arrange a moderate-sized urgent telephone conference, you have conference-communications at your service. It makes it possible to carry on a conversation with several subscribers at one time. And those numbers which are called most often can be dialed in abbreviated form: dial just 2 or 3 digits, and a machine at the ATS [automatic telephone station] will dial the rest for you. The new quasi-electronic and electronic communications systems, the implementation of which is planned for the next few years, will provide high quality and reliability and will require fewer service personnel."

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USSR

UDC 681.3.51.007

ZAKHAROV, V. I., and RUKIN, YU. N., (engineers)

BRANCH AUTOMATED MANAGEMENT SYSTEMS. EXPERIENCE OF DEVELOPMENT AND INTRODUCTION (BASED ON MATERIALS FROM FIRST ALL-UNION CONFERENCE)

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 7, 1976 pp 61-63

[Abstract] The current stage in the creation automated management systems for branches of industry [BAMS] can be characterized by the fact that, based on the experience gained in development and application of the first levels of the AMS, individual subsystems and complexes, further increases in the scientific and technical level of systems are being achieved, refining their functional structure, the information, software and hardware base. The most important change which has occurred recently has been the introduction of third generation computers, the assimilation of third generation computer software and the introduction of universal algorithmic languages, resulting in a drop in the cost of development of BAMS, more orderly document flow among component control systems, the creation of classifiers and information banks, supporting information interaction of BAMS with other systems. These problems were discussed at the First All-Union Conference on Branch Automated Management Systems, held in Moscow in September of 1975. Some 600 representatives of scientific institutions, industrial enterprises

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ZAKHAROV, V. I., and RUKIN, YU. N., PRIBORY I SISTEMY UPRAVLENIYA No 7, 1976 pp 61-63

and educational institutions in the country, as well as state organizations at the Union and Republic level, attended the conference. Some 95 reports were heard and discussed. The following resolutions were adopted: to recommend that ministries and departments make a complete transition to BAMS using third generation computers during the tenth five-year plan, to ask the State Committee for Science and Technology to hold conferences on problems of improvement of control of branches of the national economy in coordination with the functioning of BAMS, to ask the State Standard Committee to accelerate the development of All-Union classifiers, so that they might be used in the creation of the information basis for BAMS, to ask the USSR Radio Industry Ministry to increase the production of third generation computers with the peripheral devices required for BAMS and to ask the USSR Communications Ministry to accelerate work on the creation of BAMS interconnection equipment.

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USSR

POL'KIN, A., deputy chief of the Administration for Science and Automated Management Systems of the Ministry of Trade USSR; and KOCHAROVA, T., head of a department of "Soyuztorgsistema" [expansion unknown]

ALL-UNION SEMINAR ON AUTOMATED TRADE MANAGEMENT SYSTEMS

Moscow SOVETSKAYA TORGOVLYA in Russian ("As ASU's Evolve") 13 Nov 76 p 3

[Abstract] An all-union seminar, organized by the Ministry of Trade USSR and the Exhibition of Achievements of the National Economy USSR, was devoted to experience in creating automated trade management systems. The seminar, which was held in Moscow, attracted more than 230 specialists from the research and design organization of the Ministry of Trade and Tsentrosoyuz [Central Union of Consumers' Societies USSR], as well as representatives of Gosplan USSR.

In their speeches and discussions, the participants recognized that one of the most important goals is increasing the effectiveness of ASU's [automated management systems] and computer centers. They noted that some basic shortcomings and difficulties have been encountered in the automation of the trade sector of industry, and they made a number of suggestions on  
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POL'KIN, A., and KOCHAROVA, T., SOVETSKAYA TORGOVLYA 13 Nov 76 p 3

how to eliminate them. The seminar also adopted a number of recommendations on the expansion of scientific research and design work in the field of the methodology of creating and using standardized design solutions in trade ASU's, the development of overall systems problems and standardized economic-mathematical models, and the creation and introduction of industry-wide classifiers for the trade sector.

Theses of the papers presented at the seminar have been published in a special volume.

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USSR

SEMINAR OF SOVIET AND AMERICAN SCIENTISTS IN RIGA

Riga SOVETSKAYA LATVIYA in Russian 1 Oct 76 p 3

[Summary] A Soviet-American seminar on economic-mathematical modeling and the use of computers for planning and control of large-scale agrarian-industrial complexes opened on 30 September 1976 in Riga at the Scientific Research Institute of Planning under Gosplan Latvian SSR. Participants of the seminar met with local workers from Gosplan and a number of republic ministries on 30 September, and visits to farms and to the Latvian Scientific Research Institute of Animal Husbandry and Veterinary Science are also planned.

The seminar is being carried out in accordance with the Soviet-American agreement on scientific-technical cooperation in the field of "Use of Electronic Computers in Control." The American delegation is headed by Don Aufemkamp, senior advisor of the National Science Foundation of the USA.

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SYMPOSIUM OF CYBERNETICIANS HELD IN TBILISI

Tbilisi ZARYA VOSTOKA in Russian 11 Nov 76 p 3

[Summary] Among the participants of the VIII All-Union Symposium on Cybernetics, which just opened in Tbilisi, are Corresponding Member of the Academy of Sciences USSR Ye. Popov, N. Buslenko, and A. Roytbak; Academician of the Academy of Sciences Georgian SSR. V. Chavchanidze; Professors Yu. Zhuravlev, A. Kogan, V. Nalimov, V. Akhutin, A. Napalkov; and others.

The problems of modeling information processes in goal-oriented behavior will be the center of attention. The participants will discuss theoretical methods of investigating information processes, modeling of information processes in man-machine systems, and problems of the study of information processes in the fields of neurocybernetics, linguistics, and engineering psychology.

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VIII ALL-UNION SYMPOSIUM OF CYBERNETICIANS

Tbilisi ZARYA VOSTOKA in Russian ("All-Union Symposium of Cyberneticians")  
13 Nov 76 p 2

[Summary] The VIII All-Union Symposium of Cyberneticians was concluded today in Tbilisi. It was organized by the Scientific Council on the Interdisciplinary Problem "Cybernetics" under the Presidium of the Academy of Sciences USSR, the Institute of Cybernetics of the Academy of Sciences of Georgia, and the Georgian Section of the Scientific Council on the Interdisciplinary Problem "Cybernetics" under the Department of Applied Mechanics and Control Processes of the Academy of Sciences Georgian SSR. More than 500 specialists heard and discussed 19 papers on the urgent problems of modeling information processes in goal-oriented behavior.

The many-sided research discussed included work on the development of artificial systems which could take over certain human functions in space, or in the depths of the ocean, or under harmful or difficult conditions. Scientists are striving to create robots which could control complex technological processes in industry and agriculture, economic planning, and  
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ZARYA VOSTOKA 13 Nov 76 p 2

other areas of the national economy. All these future artificial systems, however, require an intellect and thus scientists are faced with the task of creating a general-purpose intellect capable of using information in complex circumstances and acting independently and in a goal-oriented manner in the solution of diverse practical problems.

USSR

IVANENKOV, V. V. and RZHANOVICH, P. K.

CONFERENCE ON SCIENTIFIC MEDICAL INFORMATION

Moscow NAUCHNO-TEKHNICHESKAYA INFORMATSIYA. SERIYA 1, ORGANIZATSIYA I  
METODIKA INFORMATSIONNOY RABOTY in Russian ("Information, Reviews")  
No 11, 1976 p 36

[Summary] A conference to discuss "Organizational Bases of the System of Information Support for Scientific Research in Pediatrics" was held 23 June 1976 in the Moscow Scientific Research Institute of Pediatrics and Childrens Surgery of the Ministry of Public Health RSFSR. This was the first conference convened in a scientific research institute within the framework of the creation of an Industry-wide Automated System of Scientific Medical Information [OASNMI]. The Institute of Pediatrics of the Ministry of Public Health RSFSR is the first institute to have developed specifications for an information support system for a sector of industry.

Some of the papers presented at the conference were on urgent problems of scientific medical information, organization of an information support system within the framework of an industry-wide scientific medical

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IVANENKOV, V. V. and RZHANOVICH, P. K., NAUCHNO-TEKHNICHESKAYA INFORMATSIYA. SERIYA 1, ORGANIZATSIYA I METODIKA INFORMATSIONNOY RABOTY NO 11, 1976 p 36

information system, putting together information-reference data banks of industry-wide scientific medical information, patent information in the Moscow Scientific Research Institute of Pediatrics and Childrens Surgery, some methods of processing foreign scientific-medical information; and basic foreign centers for clinical genetics and neopathology. Participating in the discussions were representatives from the departments of scientific medical information of various Moscow research institutes, the All-Union Scientific Research Institute of Medical and Medico-Technical Information of the Ministry of Public Health USSR, the Republic Department of Scientific Medical Information of the Ministry of Public Health RSFSR, as well as scientific associates of the Institute of Pediatrics.

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USSR

TSEYTLIN, G. YE.

ALL-UNION SEMINAR "COMPUTER SYSTEMS AND ROBOTS"

Kiev KIBERNETIKA in Russian No 4, Jul/Aug 76 pp 150-151

[Abstract] An All-Union Seminar on the Problem "Computer Systems and Robots" was held in Smolensk 2-5 Mar 1976. It was organized by the Scientific-Technical Society of Radioengineering, Electronics, and Communications imeni A. S. Popov, the Scientific Research Center for Electronic Computer Technology in Moscow, and the Smolensk Affiliate of the Moscow Order of Lenin Power Engineering Institute. The following organizations were among those represented at the seminar: the Institute of Mathematics of the Siberian Department of the Academy of Sciences USSR (Novosibirsk), the Institute for Building Aviation Instruments (Leningrad), the Institute of Cybernetics of the Academy of Sciences Ukrainian SSR (Kiev), Frunze Polytechnical Institute, and the Bashkir Affiliate of the Academy of Sciences USSR (Ufa).

Topics in the following three main areas were discussed at the seminar: interdisciplinary problems in robot control systems and approaches to their solution, ways of creating hardware for computer systems and highly productive structures, and theoretical and practical aspects of the problem of designing software for computer systems.

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USSR

ADEL'SON-VEL'SKIY, G. M. and IVANENKO, L. N.

ALL-UNION SEMINAR ON PROGRAMMING OF GAMES

Kiev KIBERNETIKA in Russian No 4, Jul/Aug 76 p 151

[Abstract] The First All-Union Seminar on Programming of Games, organized by the Institute of Control Problems of the Academy of Sciences USSR and the Computer Center of the Academy of Sciences Armenian SSR, was held 26-29 April 1976 in the city of Dilizhan (Armenian SSR). Programming of games (e.g., chess-playing computers) is an important field of research on artificial intellect and one in which the Soviet Union has made definite achievements.

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USSR

ZADOROZHNYI, E. M.

PROBLEMS OF METASCIENCE AND SCIENTIFIC-TECHNICAL FORECASTING

Kiev KIBERNETIKA in Russian No 4, Jul/Aug 76 pp 148-149

[Abstract] The VI Kiev Symposium on Metascience [naukovedeniye; "the science of science"] and Scientific-Technical Forecasting was held from 30 March to 2 April 1976. It was organized by the Sector on Interdisciplinary Problems of Metascience of the Institute of Cybernetics, Academy of Sciences Ukrainian SSR, together with the Republic House of Economic and Scientific-Technical Propaganda Ukrainian SSR UkrNIINTI [Ukrainian Scientific Research Institute of Scientific-Technical Information, and Technical-Economic Research], and the "Science" Pavilion of the Academy of Sciences Ukrainian SSR.

Approximately 700 scientists from 80 Soviet cities and from the GDR, Bulgaria, and Poland attended. More than 100 papers were read at the plenary sessions and at the sectional meetings devoted to the following topics: theoretical problems of metascience; problems of scientific-technical potential (characteristics and principles of allocation of scientific potential, analysis of the state and training of scientific cadres, special features of material-technical support for modern science, ways of intensifying the use and  
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ZADOROZHNYI, E. M., KIBERNETIKA No 4, Jul/Aug 76 pp 148-149

control of scientific-technical potential); organization of and procedures for developing scientific-technical forecasts; design and functioning of information-forecasting systems and the use of programmed forecasting methods; information, systems engineering, and mathematical software for the control of science; economic problems of the control of science; social-psychological and organizational problems of the control of science; and planning scientific research. The speakers included Academician V. M. Glushkov, who discussed urgent problems in the control of scientific-technical progress, especially the development of a unified planning process based on continuously updated forecasts which are maintained in computer memories.

With the framework of the symposium there also took place an expanded visiting [rasshirennoye vyvezdnoye] session of the Section "Organization of the Activities of Scientific Research Institutes and Design Bureaus" of the Scientific Council on the Problem "Organization and Economics of Scientific-Technical Research and Development" under the State Committee on Science and Technology, USSR Council of Ministers.

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ZADOROZHNYI, E. M., KIBERNETIKA No 4, Jul/Aug 76 pp 148-149

The symposium adopted several resolutions, including a call for the establishment of centers for metascientific research in various sectors of industry, agriculture, medicine, etc. and a request to the Ministry of Higher and Secondary Specialized Education USSR to review the question of organizing the specialty "engineer for control of scientific research and planning-design work" at the appropriate VUZes.

The materials from the symposium have been published in five volumes:  
Issledovaniya po Nauchno-Tekhnicheskomy Prognozirovaniyu. Tezisy Dokladov VI Kiyevskogo Simpoziuma po Naukovedeniyu i Nauchno-Tekhnicheskomy Prognozirovaniyu, Ch. 1, 2 [Research on Scientific-Technical Forecasting. Theses of the Papers of the VI Kiev Symposium on Metascience and Scientific-Technical Forecasting, Parts 1, 2], "Naukova Dumka" Publishing House, Kiev, 1976; and Opyt i Problemy Upravleniya Naukoy. Tezisy Dokladov VI Kiyevskogo Simpoziuma po Naukovedeniyu i Nauchno-Tekhnicheskomy Prognozirovaniyu, Ch. 1, 2, 3 [Experience in and Problems of the Control of Science. Theses of the Papers of the VI Kiev Symposium on Metascience and Scientific-Technical Forecasting, Parts 1, 2, 3], published by the Institute of Cybernetics of the Academy of Sciences Ukrainian SSR, Kiev, 1976.  
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## HUNGARY

### CONFERENCE NOTICE

Budapest MERES ES AUTOMATIKA in Hungarian Vol 24, No 7, 1976 pp 269-270

[Excerpts] The Scientific Association for Metrology and Automation, in cooperation with the MTESZ [Association of Technical and Scientific Societies] member societies concerned, will hold the 8th Hungarian Automation Conference in Budapest between 4 and 8 October 1976. The goal of the conference, which is held every three years, is to present the achievements made in the fields of theory, system-engineering, instrument development, and system development by domestic institutions for research, development, manufacturing, and applications in the field of automation.

The agenda of the conference is the following:

#### I. Process Control Section.

"The Investigation of the Dynamic Properties of the Signal Converters Used in the Method of Analog Equivalent Circuits" by Dr. A. Barsony, K. Fock, and

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## HUNGARY

MERES ES AUTOMATIKA Vol 24, No 7, 1976 pp 269-270

Dr. Cs. Lehel; "Parameter-Estimating Algorithms Developed for the Use of On-Line Applications Based on the Fitting of Runup Functions" by Dr. A. Frigyes and K. Tihanyi K.; "Investigation of Parameter-Estimating and Control-Setting Algorithms Designed for On-Line Use by Means of Hybrid Simulation" by Dr. A. Frigyes and K. Tihanyi K.; "Optimization of Systems With Variable Dead Time" by R. Lunderstaedt; "Elimination of Some Disadvantages of Digital Simulation by Using Hybrid Computer Technology Principles" by J. S. Janosy and A. Szentgali; "The Use of High-Speed Fourier Transform Algorithms in Computer-Aided Process Control" by Dr. A. Frigyes and L. Langer; "Realization Aspects of Ternary Logic" by A. Bencsik; "Use of Multivalent Logical Systems in Automation and Computer-Aided Process Control" by Gy. Nemesszeghy; "Use of Microprocessor Systems in the Control of Large-Scale Processes" by G. Pintz; "Computer Program of Converter-Steel Manufacture With Oxygen" by M. Osztatni; "Some Aspects of the Two-Level Hierarchic Control of Flotation Processes" by I. Vaskovi; and "Pump System Automation for Energy Saving" by O. Roser.

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### II. Computerized Production and Manufacture Control Section

"Warehouse Control System With Integrated Computer" by H. Hajdu and A. Vero;  
"The Stock-Keeping Models of the "STOMCOS" System" by I. Panczel, L. Janoki,  
and Dr. I. Hejjas; "Automation of Materials Management" by L. Wilhelm; "Connections and Operation of the Automated Production Control System" by K. Megyery; "Automation of Time and Motion Study" by S. Fazekas; "Rough Programming of Production With Computer" by Mrs L. Hajos; "Computer-Aided Production Control System" by Mrs L. Gacsadi; "Experiences Gained in the Preparation for the Use of Production Data Acquisition System" by T. Toth; "Computer-Aided Control of the Operation of the Ingot-Heating Furnaces in Rolling Mills" by Gy. Duray and L. Edelenyi; "Automation of Laboratory Measurements in Agricultural and Food-Industry Production Control" by J. Hegedus and B. Tapa.

### III. Machine-Manufacturing Automation Section

"Automation of Technological Process Design" by Dr. M. Horvath; "Development  
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## HUNGARY

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of the Integrated Manufacturing System in the Machine-Tool Works of Csepel Works" by Sz. Czenthe; "Computerized Machine-Tool Control System - Operating Experiences at the Csepel Machine-Tool Works" by G. I. Rakoczy and Gy. Vaskovits; "Artificial Intelligence Studies in the Service of Machine-Manufacturing Automation" by Dr T. Vamos; "Automated and Computerized Electrical Designing" by I. Kovacs; "Automatic Control of Integrated Circuit Manufacturing Technology With Computerized Test-Data Processing" by J. Z. Gaspar; "The Holographic Method in the Adaptive Control of Machine-Manufacturing Industry Automation" by Dr. B. Lovas.

### IV. Industry Section

"Realization and Operating Experience of a Steel-Bottle Wall-Thickness Gauge of the Automatic, Radioisotopic, Digital, On-Line Type" by Peter Tabor and Sandor Rozsa (Isotope Institute, MTA [Hungarian Academy of Sciences]); and Dr. Karoly Voros (MTA SZTAKI [Computer Technology and Automation Research

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## HUNGARY

MERES ES AUTOMATIKA Vol 24, No 7, 1976 pp 269-270

Institute]); "Universal Numerically Controlled Coordinate Bench for Microelectronics" by Sandor Fulop and Pal Nemeth (Electronic Technology Department, BME [Budapest Technical University]), and Laszlo Kozak (VBKM [Electric Equipment and Appliance Factory] Development Institute); "IC Inserting Device Capable of Being Fitted to the ADMAP Numerically Controlled Machine" by Zoltan Pal (Electronic Technology Department, BME); "Use of the ANALCONT Process Control Device for the Control of Continuous Industrial Techniques" by Akos Szecsodi (Gamma Works); "Automatic Tuning of Arc-Extinguishing Systems" by Denes Gyorgy (North-Hungarian Power Supply Enterprise); "Metering Pump With Glass Piston" by Karoly Kapocsy, Miklos Novak, and Laszlo Viszkay (DKV [Danube Petroleum-Industry Enterprise], Main Automation Department); "Robot-Like Valve Operation" by Attila Szucs (MTA SZTAKI); "Industrial Nuclear Transmitter" By Dr. Gyorgy Endre and Janos Makkos (VBKM, Development Institute); "Measuring Automation for the Logical Analysis of Digital Networks" by Istvan Szemok, Gyula Estelyi, and Istvan Body (EMG [Electronic Measuring Instruments Factory]); "Development of the Measuring System Based on the IEC Instrument Bus Using the

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## HUNGARY

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EMG-666 Computer" by Istvan Prokopp and Ivan Vince (EMG); "Digital Signal Processing With the Portable EMG-666 Computer" by Vladimir Krizs (EMG); "Signal Recording in Terms of Shape in Digital Form, and Processing of the Signals" by Zoltan Mohos (EMG); "Panel Modules" by Bela Devecseri (EMG); "Use of Microprocessor in Machine-Tool Control Technology" by Ivan Grosschmied (EMG); "Electronic Calibration of Electric Consumption Meters and Their Adjustment in the Meter Factory of Ganz MM Works" by Karoly Annula (Ganz MM [Ganz Measuring Instrument Works]) and Miklos Kiss (EMG); "The Central Control System of the Gasoline Pipelines of the Chemical Industry" by Peter Salz, Sandor Mery, and Lajos Balczo (Petroleum and Gas Industry Design Enterprise); "New Instruments in the Liquid-Level Measuring Device Family" by Jozsef Urban (MMG [Mechanical Measuring Instrument Factory], Automation Plant); "Analog Test Circuits Developed at the MMG AM [Mechanical Measuring Instrument Factory, Automation Plant], With Special Reference to Natural Gas and Petroleum Industry Applications" by Geza Csermely (MMG Automation Plant); "Telemechanics" by Laszlo Hencz (MMG Automation Plant); "Interactions Between Transmitters and Their Manufacture" by

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## HUNGARY

MERES ES AUTOMATIKA Vol 24, No 7, 1976 pp 269-270

Dr. Sandor Kovacs; "A Highly Accurate Method for Measuring the Amount of Liquid Stored in Tank Parks" by Istvan Nagy, Tibor Deaki, Peter Kovats, and Gyorgy Varnai (MMG Automation Plant); "Use of Microprogrammed Hardware Units in Telemechanical Systems" by Andras Horvath and Andras Demeter (VEIKI [Electric Power Industry Research Institute]); "Basic Circuits Universally Usable in Control Systems of Water-Management Systems" by Istvan Horvath (BME, Process Control Department); "Two-Way Control Valve of a Novel Type" by Peter Kemenes (MTA KUTESZ [Hungarian Academy of Sciences, Research Equipment Branch]).

### Round-Table Discussions

Subjects proposed: (1) New Trends in automation; (2) Why could we not hold the "devices" section? (3) Trade and service problems of automation; (4) Status of the practical applications of artificial-intelligence methods; (5) Domestic status of the use of computers for automation purposes; (6) Theoretical studies and methods; the gap between them in Hungary; (7) Why do we not use modern

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## HUNGARY

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methods of management?

The actual discussions that will be held from among the above will be listed in the final conference program.

The texts of the papers

The texts of the papers to be presented will be published in a separate volume before the conference, and each participant will be given a copy of it.

Plant visits

We expect to organize plant visits in the following institutions for the participants of the conference; attendance is by prior registration:

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MMG Automation Plant  
VIDEOTON Development Institute  
MTA SZTAKI  
EMG.

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## B. Organizations

USSR

VEKUA, IL'YA, president of the Academy of Sciences Georgian SSR

### ACHIEVEMENTS OF GEORGIAN SCIENCE CITED

Moscow TEKHNKA -- MOLODEZHI in Russian ("A Worthy Contribution") No 12, 1976 pp 20-21

[Excerpts] During the ninth five-year plan, the scientific institutions of the Academy of Sciences Georgian SSR contributed 192 developments to the national economy, the majority of which have already found practical applications.

The Institute of Control Systems of the Academy of Sciences Georgian SSR, together with the Institute of Control Problems of the Academy of Sciences USSR, conducted important work on the creation of a unique specialized hybrid analog-digital computer complex.

As a result of the joint research of scientists from the Institute of Mechanics of Machines and the Institute of Cybernetics, an efficient optical system for automatic driving of tractors was created and is helping to intensify agricultural production.

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USSR

VEKUA, IL'YA, TEKHNKA -- MOLODEZHI No 12, 1976 pp 20-21

Along with a strengthening of the coordination of scientific research, the connection with industrial and VUZ science is being expanded by means of joint developments on the most important scientific-technical problems. The institutes of the Academy of Sciences Georgian SSR and ministerial scientific institutions are working jointly on approximately 40 topics of specific practical importance. In individual cases where the development is especially important for accelerating the tempo of research, then composite working groups of laboratories are set up on a temporary basis. For example, a laboratory has been established by two scientific institutions -- the Institute of Cybernetics of the Academy of Sciences Georgian SSR and the PKIavtomatprom [probably Design and Planning Institute for Industrial Automation] of the Ministry of Instrument Building, Automation Equipment, and Control Systems USSR.

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USSR

UDC 658.3.001.1:681.2

ITSKOVICH, E. L., POPKOV, YU. S., (Doctors of Technical Sciences), YERMILOV, YU. A., Candidate of Technical Sciences, and PEROV, A. S., Candidate of Economic Sciences

THE DEPARTMENT FOR INCREASING THE QUALIFICATIONS OF ENGINEERS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 7, 1976 pp 53-55

[Abstract] In the "Basic trends for the development of the national economy of the USSR for 1976-1980" adopted at the 25th Party Congress, one of the important tasks for the tenth five-year plan was declared to be acceleration of the rates of scientific and technical progress as a decisive condition for increasing and intensifying social production. This has resulted in a great increase in the rate of automation of the economy. This article describes the Interbranch Department for Increasing the Qualifications of Graduate Engineers of the Moscow Institute of Electronics and Automation, one center where post graduate training is given to engineers in order to allow them to keep up with the accelerating rate of automation and mechanization of production. The department has been in existence about 30 years, up to 1967 as the Department for Improvement of Graduate Engineers of the All-Union Correspondence Power Engineering Institute, and offers courses in 1/2

USSR

ITSKOVICH, E. L., POPKOV, YU. S., YERMILOV, YU. A., and PEROV, A. S.,  
PRIBORY I SISTEMY UPRAVLENIYA No 7, 1976 pp 53-55

50 areas, encompassing such important aspects as quality and reliability of products, intensification of production, prospective technical devices, methods of organizational control, AMS and other machine systems. Several thousand persons study at this institution each year. Readers are invited to write directly to the school to receive further information concerning courses and schedules.

USSR

Photo Caption

Moscow PRAVDA in Russian 2 Oct 76 p 2

[Summary] The Moscow Institute of Electronic Technology, which has been in existence for 10 years, trains highly qualified specialists in the latest trends in electronic technology and gives them a comprehensive background in higher mathematics, physics, and chemistry. Senior students participate in a two-year period of practical work at the best enterprises and scientific research institutes of the electronics institute.

In the photo [not reproduced]: in one of the institute's auditoriums.

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USSR

REVIEW OF FAR EASTERN RESEARCH CENTER

Moscow PRAVDA in Russian ("The Potential of a Scientist") 16 Sep 76 p 3

[Excerpt] This article reports some findings of a review of the Far Eastern Scientific Center of the Academy of Sciences USSR. The review was conducted by the USSR Committee of People's Control, which has forwarded a report to the Presidium of the Academy of Sciences USSR for verification and corrective measures. Among the many shortcomings noted is the fact that the Center's subdivisions do not give sufficient attention to the correct use of material resources. In a number of cases, newly acquired equipment was allowed to stand idle for a prolonged period of time. For example, in the Khabarovsk Interdisciplinary [Kompleksnyy] Scientific Research Institute, for almost a year no use has been made of an advanced computer.

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USSR

Riga SOVETSKAYA LATVIYA in Russian 14 Oct 76 p 4

[Abstract] A recent issue of the newspaper Sovetskaya Latviya carried a vacancy notice from the Institute of Electronics and Computer Technology of the Academy of Sciences Latvian SSR. The institute, which announced an opening for a senior scientific associate with the speciality "Theory of Automata and Logic Devices," gave its address as: 226006, Riga-6, ul. Akademiyas, 14 [14 Akademiyas St.]; Telepo Telephone: 55-44-09, 52-31-65.

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USSR

Photo Caption

Moscow IZVESTIYA in Russian 19 Aug 76 p 5

[Text] Barnaul. The Computer Center of the Altay Polytechnical Institute has been provided with YeS-1020 electronic computers. The computers are used in the educational process and to help solve the scientific-technical problems involved in automation of production, industrial design, etc.

In the photograph [not reproduced]: computer chief Yu. Yermakov and engineer V. Kalinichenko are observing the operation of a computer.

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## C. Personalities

USSR

Editorial Board of the journal Upravlyayushchiye Sistemy i Mashiny

RESEARCHER ON ANALOG AND HYBRID COMPUTER TECHNOLOGY WINS AWARD

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian ("On the 60th Birthday of G. Ye. Pukhov") No 5, Sep/Oct 76 p 132

[Abstract] For his services in the development of technical sciences and the training of scientific and engineering cadres and in connection with his 60th birthday, Georgiy Yevgen'yevich Pukhov, academician of the Academy of Sciences Ukrainian SSR, was awarded the Order of the October Revolution on 23 August 1976 by decree of the Presidium of the Supreme Soviet USSR. The editorial board of the journal Upravlyayushchiye Sistemy i Mashiny [Control Systems and Machines] extend their sincere congratulations and best wishes to Georgiy Yevgen'yevich and wish him new achievements in his fruitful work on the creation of new and highly effective analog and hybrid computer technology resources.

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USSR

PLETNEVA, A.

A. Lanne LECTURES IN TALLIN

Tallin SOVETSKAYA ESTONIYA in Russian ("The Lectures and Seminars of Prof. A. Lanne") 13 Nov 76 p 2

[Summary] A tall, dark-haired man of 40 may be seen these days in Tallin Polytechnical Institute, conducting lectures and seminars for the staff of the Faculty of Electroautomation and the Chairs of Radio Engineering, Automation and Electronics, as well as for associates of various scientific research institutes and enterprises in the city of Tallin. This is Doctor of Technical Sciences A. Lanne of the Military Communications Academy, author of 5 monographs and more than 100 scientific articles, a student of the well-known scientist A. Beletskiy, who is a laureate of the State Prize and founder of the Soviet school for the theory of synthesis of electronic circuits.

"The topic of our conversations in Tallin," said A. Lanne, "is questions connected with the creation of a different type of reliable and highly effective electronic instruments. It is necessary to say that rather

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USSR

PLETNEVA, A., SOVETSKAYA ESTONIYA 13 Nov 76 p 2

extensive work in this field is being carried out in Tallin Polytechnical Institute. This VUZ not only has contracts with a number of plants in Tallin and scientific research institutes in the republic, but also with enterprises beyond its [Estoniya's] borders. At the basis of the fulfillment of many of these orders are the methods and principles of the science which is called the theory of electrical circuits. The achievements of this science are widely used for the solution of concrete problems."

This is Prof. Lanne's first contact with the scientists of Tallin Polytechnical Institute. He is now planning to return home to Leningrad, where he will give more lectures, consultations, and seminars, carry out all sorts of public duties, and work on his new monograph Optimal'nyy Sintez Elektronnykh Skhem [Optimal Synthesis of Electronic Circuits], which will be published by the "Svyaz'" [Communications] Publishing House.

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D. Publications

USSR

UDC 62-50:007:50

DIGITAL AIRCRAFT SYSTEMS FOR MONITORING AND CONTROL

Leningrad AVIATSIONNYYE TSIFROVYYE SISTEMY KONTROLYA I UPRAVLENIYA in Russian, "Mashinostroyeniye," 1976 608 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G5 K]

[No abstract]

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USSR

KRINITSKIY, N. A. [Reviewer]

AUTOMATION OF PLANNING OF COMPUTERS

Moscow PROGRAMMIROVANIYE in Russian No 4, 1976 pp 108-109

[Review of the book Avtomatizatsiya Proyektirovaniye Vychislitel'nykh Mashin by V. M. Glushkov, Yu. V. Kapitonova, A. A. Letichevskiy, Kiev, Naukova dumka Press, 1975, 231 pp]

[Abstract] This is the first domestic monograph written by leading specialists in the area of automation of planning in which the methodology of construction of automated planning systems for computers and the application of such systems in the process of creation of new computer equipment hardware are described. The monograph reflects and summarizes the experience of many investigations of the Institute of Cybernetics, Acad. Sci. UkSSR in this area, describes the structure of the PROYEKT system, one of the most highly developed and promising automated systems for planning developed in the Soviet Union. The monograph consists of three chapters. Chapter 1 describes the hardware used for logical planning of discrete devices. Chapter 2 discusses the means of planning and

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USSR

KRINITSKIY, N. A., PROGRAMMIROVANIYE No 4, 1976 pp 108-109

realization of the process of planning. Here are discussed such problems as placement and organization of data, control of the performance of instructions and means of control of the developed system. Chapter 3 discusses the means for development of program systems. A specialized programming system, equipped with a rich set of programs, is a rich and flexible tool for tuning, improving and developing a planning system. More detailed information on PROYEKT is presented in this chapter. The reviewer states that the monograph contains rich material on the structures of automated planning systems for planning of computer hardware. The book reflects today's level and prospects for development of automated planning systems.

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USSR

#### NEW BOOK ANNOUNCEMENTS

Moscow GENERATOR PROGRAMM VVODA DANNYKH DLYA YES EVM [Program Generator for Data Input to the Unified System of Computers] by V. N. Agafonov, M. L. Zil'burg, N. L. Malinovskiy, I. V. Romanovich, S. I. Taranko, E. N. Khotyashov, and A. N. Shemetov, "Statistika" Publishing House, 1976 pp 143-144

[Abstract] A recent book on a program generator for the United Computer System carried an announcement of two new books which will be published by "Statistika" Publishing House in 1976.

Supervizor OS YeS EVM [Supervisor for the Operating System of the Unified System of Computers], by V. V. Naumov, V. G. Peledov, Yu. A. Timofeyev, and A. G. Chekalov, contains information on the capabilities of a supervisor for the OS YeS operating system. Some familiarization with the Assembler language, the YeS hardware, and the capabilities of the OS YeS is required. The book will serve as a manual for programmer-users and systems programmers who are using the OS YeS and helping to develop complex control systems.

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USSR

GENERATOR PROGRAMM VVODA DANNYKH DLYA YES EVM 1976 pp 143-144

Prikladnyye Programmy v Sisteme Matematicheskogo Obespecheniya YeS EVM  
[Applied Programs in the Software System for the Unified System of Computers],  
by A. Ye. Fateyev, A. I. Roytman, and T. P. Fateyevaya], deals with principles  
for developing packages of applied programs. It will be useful to specialists  
who use modern computer resources in their work and to students in higher  
educational institutions.

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USSR

UDC 62-5

CYBERNETICS AND PRESENT-DAY SCIENTIFIC KNOWLEDGE

Moscow KIBERNETIKA I SOVREMENNOYE NAUCHNOYE POZNANIYE in Russian, "Nauka,"  
1976, 428 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G1K by  
V. K. Pryanikova]

[Text] An analysis is made of problems of formation of the basic concepts of cybernetics; the part played by the systems approach, information theory and the theory of operations research in expanding the capabilities of current scientific knowledge is explained; an examination is made of the particulars of the creative process, especially the phenomenon of activity, in connection with the development of the theory of self-organization; the process of computer derivation of theorems is considered as well as the capabilities and limitations of modeling of artistic creativity. Naturally the book does not cover all questions relating to the field of cybernetics. A number of articles deal with questions in the stage of discussion.

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USSR

UDC 518.74

BRONER, YU. D.

SOFTWARE FOR TIME-SHARING SYSTEMS

Moscow MATEMATICHESKOYE OBESPECHENIYE SISTEM S RAZDELENIYEM VREMENI in Russian, 1976, 61 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V777K]

[Text] The book consists of an introduction and three chapters: 1. Problems of software for time-sharing systems; 2. Operational time-sharing system; 3. Software for administrative control of time-sharing systems.

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USSR

UDC 007.5:65.012.122(02)

MATHEMATICAL PROGRAMMING AND RELATED PROBLEMS. TRANSACTIONS OF THE SEVENTH WINTER SCHOOL, DROGOBYCH, 1974. COMPUTATIONAL METHODS

Moscow MATEMATICHESKOYE PROGRAMMIROVANIYE I SMEZHNYE VOPROSY. TRUDY SED'MOY ZIMNEY SHKOLY, DROGOBYCH, 1974 g. VYCHISLITEL'NYYE METODY in Russian, Academy of Sciences USSR, Central Mathematical Economics Institute, 1976, 232 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G359K by V. K. Pryanikova]

[Text] The collection contains 14 articles that examine iteration processes of mathematical programming, including heuristic procedures of the pattern recognition type; approximate solution of contemporary variational problems; the general problem of fractional programming; the dynamic problem of non-convex programming; the problem of optimum utilization of a system of reproducible resources and so forth.

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MATHEMATICAL PROGRAMMING AND RELATED PROBLEMS. TRANSACTIONS OF THE SEVENTH WINTER SCHOOL, DROGOBYCH, 1974. CONVEX PROGRAMMING

Moscow MATEMATICHESKOYE PROGRAMMIROVANIYE I SMEZHNYYE VOPROSY. TRUDY SED'MOY ZIMNEY SHKOLY, DROGOBYCH, 1974 g. VYPUKLOYE PROGRAMMIROVANIYE in Russian, Academy of Sciences USSR, Central Mathematical Economics Institute, 1976, 199 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10V545K]

[Text] A collection that contains the texts of 24 papers on convex programming and related topics. The articles are abstracted separately.

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MODELS AND METHODS OF SOLVING PROBLEMS IN AUTOMATED CONTROL SYSTEMS

Moscow MODELI I METODY RESHENIYA ZADACH ASU. NAUCHNYYE TRUDY. MOSKOVSKIY INSTITUT UPRAVLENIYA [Scientific Papers. Moscow Control Institute] in Russian No 106, 1975, 255 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G375K]

[Text] The collection presents papers by workers at the Scientific Computing Center of Moscow Control Institute that generalize different stages in the development of automated systems. The collection consists of two thematic divisions: the first division contains 25 papers by workers in the Department of Methodology of Control of Capital Construction, the Department of Optimization of Control of Structural Production, and the Department of Automated Control Systems for Agencies. These papers examine questions in the design and improvement of control systems in construction with application to different hierarchical levels. Models and formal methods are considered for solving separate control problems. The second division contains seven papers by workers in the Department of Information Systems that deal with various questions in design of systems for automated management of institutions of higher education. [ASU VUZ].

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USSR

HANDBOOK ON SCIENTIFIC-TECHNICAL INFORMATION ORGANIZATIONS

Moscow NAUCHNO-TEKHNICHESKAYA INFORMATSIYA. SERIYA 1, ORGANIZATSIYA I METODIKA INFORMATSIONNOY RABOTY in Russian ("Attention, Readers!") No 11, 1976 p 32

[Excerpts] The All-Union Institute of Scientific and Technical Information [VINITI] is preparing for publication the handbook Organy Nauchno-Tekhnicheskoy Informatsii SSSR [USSR Scientific-Technical Informations Organs]. The handbook will include information on 182 central information organs in the State System of Scientific-Technical Information USSR; all-union, central, sector of industry, republic, and intersectorial territorial organs.

The handbook indicates the basic goals of information organs, the subjects and forms of the leading information-reference service, and the availability and subjects of automated information retrieval systems; it describes the characteristics of an information-reference and library data bank.

In order to facilitate contacts between users of information and information organs, as well as between the information organs themselves, the handbook  
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USSR

NAUCHNO-TEKHNICHESKAYA INFORMATSIYA. SERIYA 1, ORGANIZATSIYA I METODIKA INFORMATSIONNOY RABOTY No 11, 1976 p 32

gives the telephone numbers of the subdivisions which can provide required data on the information-reference service. For convenience in searching for a required service topic, the handbook has been provided with a subject index.

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USSR

UDC 62-50:007:57

APPLIED MATHEMATICS AND COMPUTER TECHNOLOGY IN BIOLOGY. COLLECTED SCIENTIFIC PAPERS

Leningrad PRIKLADNAYA MATEMATIKA I VYCHISLITEL'NAYA TEKHNIKA V BIOLOGII. SBORNIK NAUCHNYKH TRUDOV in Russian No 1, Academy of Sciences USSR, Scientific Committee on the Complex Problem of Human and Animal Physiology, Institute of Physiology, 1975 177 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G268K by V. K. Pryanikova]

[Text] The three major divisions -- "Mathematical Methods in Biology," "Automation of Biological Research" and "Systems Programming" -- correspond to the main areas of research being done at the computing center of the Institute of Physiology imeni I. P. Pavlov, Academy of Sciences USSR, which serves four other biological institutes of the Academy of Sciences in Leningrad in addition to the Pavlov Institute of Physiology. All papers to one extent or another relate to biological research and are interconnected.

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USSR

UDC 62-50:007.65

MASAKOV, V. M., RUBINSHTEYN, A. G. and CHERNYSHEV, A. A. (science editors)

PROBLEMS IN THE MODELING OF ECONOMIC SYSTEMS. COLLECTION OF SCIENTIFIC PAPERS

Novosibirsk PROBLEMY MODELIROVANIYA EKONOMICHESKIKH SISTEM. SBORNIK NAUCHNYKH TRUDOV in Russian, Siberian Department of the Academy of Sciences USSR, Institute of Economics and Organization of Industrial Production, 1976, 130 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G336K by V. M. Kholod'kov]

[Text] The book contains papers on modeling of the national economy as a whole in which types of expanded production, possibilities for using different dimensionless functions in applied models of national economic simulation, and problems of using models are investigated. An examination is made of problems of matching models in hierarchically organized complex systems of economy. Model applications are considered that are based on ideas of mathematical programming and principles of equilibrium in regional economy. The authors discuss questions of the influence that the existing

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USSR

MASAKOV, V. M., RUBINSHTEYN, A. G. and CHERNYSHEV, A. A., PROBLEMY  
MODELIROVANIYA EKONOMICHESKIKH SISTEM. SBORNIK NAUCHNYKH TRUDOV 1976  
130 pp

organizational structure has on the results of solution of optimization problems, questions of the accord between different production indices and the principles of design of different models. Also discussed are questions of establishing proportions among personal incomes and the national revenue, problems of the functioning of the non-productive sphere and its individual components and so forth. Elaborations are given on principles of differentiation and standardization of territorial systems on different levels.

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USSR

UDC 007.5:50

SEMENOV, A. V.

SOLUTION OF TECHNICAL PROBLEMS ON ANALOG COMPUTERS

Kalinin RESHENIYE TEKHNICHESKIKH ZADACH NA ANALOGOVYKH VYCHISLITEL'NYKH  
MASHINAKH in Russian, Kalinin Polytechnical Institute, 1976 133 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G489K by  
V. A. Garmash]

[Text] The book contains the following chapters: analog equipment as an engineering research technique, operational resolvers for structural analog computers, general procedures for programming analog computers; problem solution on analog computers.

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USSR

UDC 62-501.12(02)

SYSTEMS ANALYSIS AND INSTITUTIONS OF HIGHER EDUCATION

Moscow SISTEMOTEKHNIKA I VUZ. NAUCHNYYE TRUDY. MOSKOVSKIY INZHERNO-EKONOMICHESKIY INSTITUT [Scientific Transactions. Moscow Engineering Economics Institute] in Russian No 94, 1975 135 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G15K by V. K. Pryanikova]

[Text] In this collection, which contains 18 articles, are included materials on a number of current problems in development of systems for automated management of institutions of higher education [VUZ's]. The articles cover a number of basic principles underlying effective development and operation of these automated management systems. The authors discuss an extensive class of problems handled by systems for automated management of institutions of higher education on a unified procedural and systems analysis basis. Individual systems analysis solutions are described.

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USSR

UDC 007.5:362

IVANOV, A. P.

COMPUTATIONAL PARAMETERS OF ECONOMIC PROBLEMS

Moscow VYCHISLITEL'NYYE PARAMETRY EKONOMICHESKIKH ZADACH in Russian, "Statistika," 1976 168 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G341K by V. A. Garmash]

[Text] A systematization is presented of Soviet and non-Soviet experience in the area of preparing economics problems for computer solution; a set of parameters is introduced to describe the elements of the problem (input data, operators for transformation of data files) and for estimating resources (labor, cost, machine time) in computer solution of economics problems. The book deals with topics in the development and introduction of standards and norms for the work of personnel and equipment in computer information centers. The techniques for estimation of resources are illustrated by data for computers of the "Minsk-32" and YeS [Unified System] type. The book contains the following chapters: parametrization of input data for economics problems; organizing the preparation of economics problems for computer solution; work involved in programming problems in an automated enterprise management system; expenditure of machine time on data processing; cost indices of computer solution of problems.

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POLAND

UDC 62-50:007:61

SKOWRONEK, M., STARZEWSKA, E. and ZNAMIROWSKI, L. (editors)

HYBRID INFORMATION SYSTEMS IN MEDICINE

Gliwice ZESZYT SPECJALNY POŚWIĘCONY PRACOM MGR INŻ. MARCINA BRODZIAKA Z  
DZIEDZINY TECHNIKI HYBRYDOWEJ I SYSTEMÓW INFORMATYCZNYCH W MEDYCYNIE [A  
Special Issue Dedicated to the Works of Master Engineer Marcin Brodziak  
in the Field of Hybrid Techniques and Information Systems in Medicine] in  
Polish, scientific issue PŚl., No 448, 1976, 107 pp

[From REFERATIVNYY ZHURNAL, KIBERNETIKA No 10, 1976 Abstract No 10G299K  
(résumé)]

[Text] The book contains the results of studies done by Marcin Brodziak  
in the area of utilization of hybrid systems for analyzing disturbances of  
cardiac rhythm, and also in the field of hospital information control systems.  
The book consists of two parts: 1. General Principles of Design of Hybrid  
Systems for Analysis of Disturbances in Cardiac Rhythm. Algorithms are given  
for detection of rhythm disturbances, and the theory of the ventricular  
gradient of the heart is presented. 2. An Examination of Hospital Hybrid  
Information Systems. References 9.

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CSO: 1863

- END -